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Proposal for

**THE ^LHALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

Prepared for the

WATERFRONT CO - ORDINATING

AND TECHNICAL

COMMITTEES

February 8, 1972

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February 8, 1972

Waterfront Co-ordinating Committee
The Halton Region Conservation Authority
225 Main Street
MILTON, Ontario

Attention: Mr. B. Humphreys
Chairman

Dear Sirs,

Re: Halton-Wentworth Lake Ontario Waterfront Study

We are honoured to have been given the opportunity to make this submission and sincerely hope that it will allow us to be of service to your Committee.

At the outset it was determined that the conceptual study of the Halton-Wentworth Lake Ontario waterfront is a study of great significance and complexity. It demands a wide range of disciplines and requires professional input of the highest calibre. It was felt that a single group would not contain all the capabilities to the degree required. For this reason Acres Consulting Services Limited and Project Planning Associates Limited have joined forces. We feel this consortium provides a range of professional skills and experience unequalled in its relevance to a study of this nature.

In this consortium it is proposed that Acres Consulting Services Limited would undertake the prime responsibility for the consultant group.

The proposed study is designed to provide a broad viewpoint recognizing all relevant factors and interests in the development of the waterfront. This submission has been structured in the following manner:

- Section A, which follows this letter, sets out the study approach proposed in concise outline form, including naming key members of the study team and listing study cost estimates;
- Section B, provides backup to Section A in setting out in detail the full technical work which will be carried out in each aspect of the study;
- Section C, provides a brief description of the companies, the curricula vitae of each of the technical specialists, including specialist consultants who will be involved in the work. It also provides a selected range of past project experience with special bearing on the different study elements.

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Toronto 210, Canada

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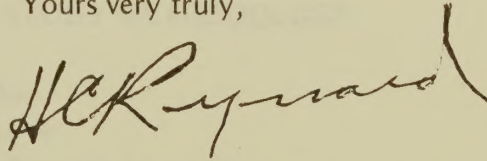
We would expect that the first project step would be the further definition of the study program in close consultation with the Committees.

Our consultant group, if selected to carry out the study, would open an operational office within the study area, (probably in the Hamilton-Burlington area as guided by the Committee). This would allow team members to be in close contact with sources of data and would allow the Committees, agencies and interested citizens' groups easy access to the consultant team and their project director. Specialist backup utilizing the home offices of the consultant group will also be available.

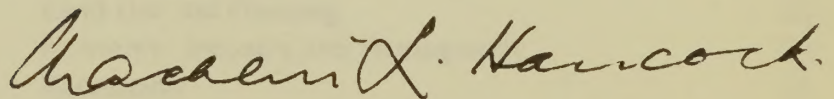
As set out in this submission the consultant group will work closely with the Committees through regular information and decision meetings. The entire study, including presentation of conceptual plans and supporting documentation, will be completed within ten months.

We trust that this submission contains all the necessary information and, if required, we are ready to discuss any aspect of it with the Committee. We regard this important environmental-planning assignment with great interest. Should we be privileged to be appointed as your consultants, we will do everything in our power to carry out the work to the entire satisfaction of the Committee.

Yours very truly,

A handwritten signature in dark ink, appearing to read 'H.C. Rynard', written in a cursive style.

H.C. Rynard, President
Acres Consulting Services Limited

A handwritten signature in dark ink, appearing to read 'M.L. Hancock', written in a cursive style.

M.L. Hancock, President
Project Planning Associates Limited

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Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

SECTION A

"STUDY APPROACH"

SECTION A

STUDY APPROACH

1. THE CONTEXT

How we interpret the Assignment

The Halton-Wentworth Waterfront Study has been created to respond to the impact of population and urban growth upon the environment of the western end of Lake Ontario. This environment has been historically the focus of important developments such as:

- major population centres,
- key industrial sites,
- transportation corridors and terminals,
- important recreational and landscape resources.

This environment represents therefore a priceless resource which is coming under increasing and conflicting demands for its use.

It is our interpretation that the assigned study is the first part of a two part planning and implementation process. It should provide a conceptual framework for subsequent detailed sector studies to be prepared as and when circumstances demand or as and when funds are available. The concept(s) should be supported by a comprehensive data base compiled in such a way that information can be readily retrieved and related to changing circumstances in the future.

Fundamentally the concept(s) will be based on the physical suitability of different parts of the waterfront for specific uses. In arriving at the concepts the relative capability of the land for different uses will be assessed against such factors as development pressures, government policies, infrastructure requirements and so on. Only where there are significant issues requiring detailed planning solutions at this time, will detailed analyses of financial costs and returns be undertaken.

Figure 1 shows the extent of the waterfront area to be studied and its hinterland. A precise definition of study boundaries is not possible at this time. We anticipate that the boundaries defined in the Terms of Reference will require adjustment as the study proceeds. All such adjustments will be agreed with the Committee.

To achieve the above objectives the study must incorporate the following four qualities. It must be:

Research Based — The recommended waterfront use concepts are to be based upon thorough research of the relevant subjects including: the capacity of the physical environment, the goals and demands of the community, and the functional characteristics and needs of the service infrastructure.

Related to Community Attitudes — Community participation both public and official, must be an important component in identifying

waterfront use of concepts and plans and in establishing a climate of acceptance of such proposals.

Conceptual in Nature — The study is to identify opportunities and demands for the use of the different waterfront areas and to establish feasible use concepts. These are to be defined as general characteristics of use rather than as detailed proposals.

Flexible and Implementable — The recommended waterfront use concepts are to be evaluated in terms of their relation to the above subjects, and their economy and feasibility for implementation.

The study program outlined later in the proposal is structured in relation to these four basic elements. Final recommendations and findings of the project will consist of the following:

1. Full documentation of the data, criteria and analyses of the basic research in such areas as: physical environment, community needs and demands, infrastructure and service needs, and public participation results.
2. A rating of waterfront areas in terms of use capabilities.
3. A presentation and evaluation of feasible alternative conceptual plans of waterfront development.
4. Recommendations on an implementation program related to social, financial, administrative and legal needs and requirements.
5. The determination of relatively finite waterfront concepts in areas with urgent needs for the resolution of current problems. Areas where such finite treatment is required include the Hamilton Harbour area, and parts of the waterfront of Burlington.

The foregoing describes broadly our interpretation of the Halton-Wentworth Waterfront Study. Subsequent portions of this proposal describe the program whereby the consultant, working for and with the Co-ordinating Committee and the Conservation Authorities Branch, will prepare a Waterfront Concept Plan by December 31, 1972.

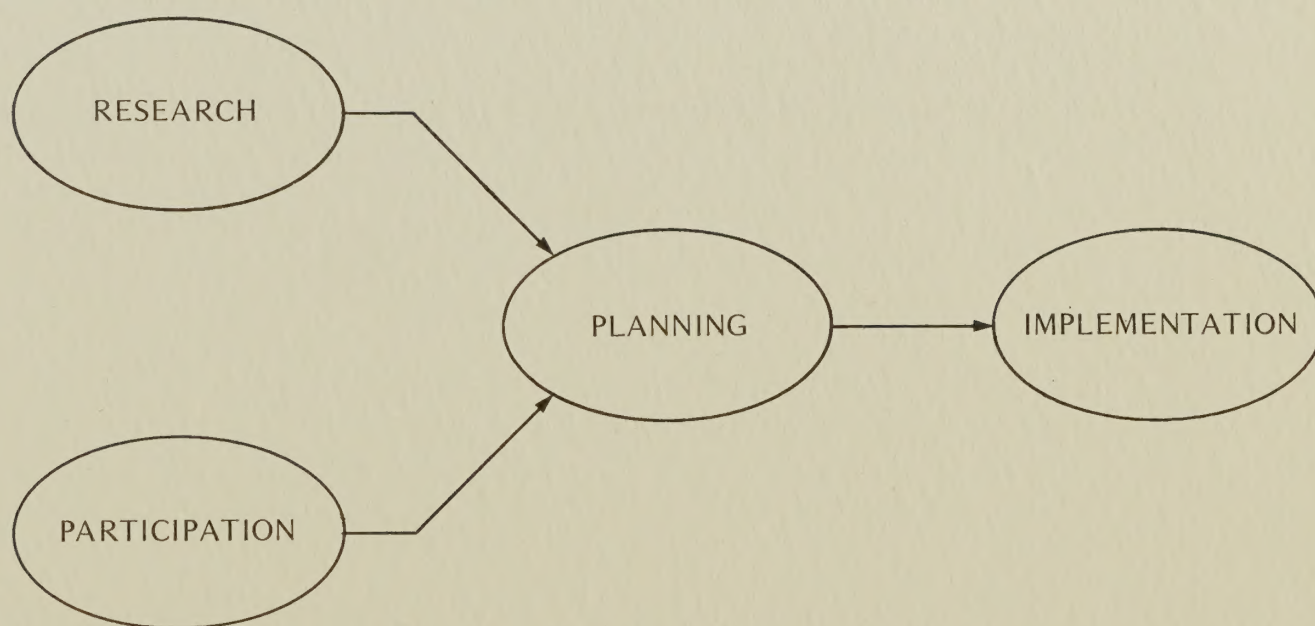
In essence, the program is designed to analyse and reconcile the respective requirements and characteristics of:

- the environment, its conservation requirements and development opportunities;
- the community, its inherent goals, resources and demands;
- the service infrastructure, and its criteria and functional needs.



WATERFRONT AREA AND HINTERLAND

FIGURE 2



MAJOR STUDY COMPONENTS

The proposed research program will deal with each of these aspects thoroughly, and the implications of different waterfront uses in terms of the relative costs and impacts will be presented to the Committees. A growing community creates needs and demands and these can only be met at costs both to the community and to the environment. The community and its representatives must be prepared to choose the form and extent of these costs.

2. OVERALL STUDY PROCEDURE

Introduction

The basic processes to be carried out in the course of the Waterfront Study are those of data collection and analysis, synthesis, concept preparation and evaluation, and the development of a program of concept implementation. Many suggested study subjects must be individually researched. Subsequently, the findings and criteria from these research areas must be brought together in a process of integrating the respective variables and needs required to determine the land use and development capabilities of the different parts of the waterfront. This will in turn lead to preparation and evaluation of concepts and implementation programs.

Of special importance is the matter of public participation in the study. The determination of the desires and attitudes of a broad cross-section of the affected population and the waterfront-user groups must form a major input in the concept. Subsequently ample opportunities must be created to obtain public response to and support for the recommendations.

A further component comprises of the special studies required to make recommendations regarding certain key areas of the waterfront where the need for immediate decisions is particularly pressing. We anticipate that the requirements and terms of reference for these will be defined and mutually agreed upon early in the overall study program.

Figure 2, Study Components, illustrates the relationship between the four major study components of research, participation, planning and implementation. The following sections of this chapter outline the principal factors involved in these components, preceded by a description of the overall study work program; Section B of this proposal contains a more detailed description of each component.

Work Program and Final Terms of Reference

In view of the complexity of the waterfront, the study team must consist of a variety of professional specialists, whose separate activities must be carefully coordinated to produce a workable and cohesive final product. For this purpose we propose, as the first step in the study, to prepare a detailed work program in PERT form. This will set out the work to be undertaken by each team member, the time and budget assigned to each activity, and will indicate how each activity relates to all the other parts of the study. This program will be the specific interpretation of the study's terms of reference and its preparation will therefore require close co-ordination with the Technical Advisory Committee to ensure complete mutual understanding and agreement. The work program will be the consultant's principal guideline and means of project control and management. It will from time to time be necessary to revise parts of the program, but we propose that such revisions should only be made with the mutual consent of the client and the consultant.

Study Integration and Staging

Figure 3 illustrates, in simplified form, the functional relationships between the major study components. We emphasize our intention to achieve very close integration among the activities of the individual members of the study team, particularly in the Planning and Implementation Components, but to varying degrees also during the other study phases, frequent information exchanges among the team members are necessary to ensure a comprehensive approach.

Figure 3 also indicates the sequence of work and the approximate time allotted to each major study component.

The Research Component — Data Collection and Analysis

The team members responsible for each study subject will collect the necessary data (from interviews, available publications and files, and in the field) and analyze them. The data and the analyses (evaluations, projections, needs, relationships and criteria) pertaining to each subject will be compiled and cross-referenced to enable their optimum use, first in the subsequent phases of the study and later in the implementation of the concept.

This phase must produce the building blocks with which to create the ultimate waterfront concept. The research will pertain to all the environmental, physical, social, economic and administrative factors involved in the waterfront. The objective is to develop the fullest possible body of information and knowledge to give an accurate picture of the many separate needs, capabilities and constraints. In the subsequent phases of the study, the linkages, conflicts and cumulative effects among all the factors will be analyzed, from which the development concepts will flow.

Some nine major study subjects for data collection and analysis have been identified:

(i) Physical Environment

Those elements of land, air, water flora and fauna whose inter-relationships will directly effect various waterfront development proposals. Results of research in this area will produce data, criteria and relationships which can be called an Environmental Quality Evaluation Model.

(ii) Landscape

The physical landscape characteristics of the waterfront corridor will be surveyed with respect to its resource, environmental and aesthetic qualities, potentials and constraints.

(iii) Land Use and Planning

This will cover existing land use and development patterns and pressures, as well as current public and private policies, plans and priorities. Important parts of this activity will be the determination of current over - or under - use of land, conflicts between existing land uses and the degree to which land uses are in conformity with generally accepted urban standards and with existing public policies and plans.

(iv) Demography, Economics and Industry

Statistical data will be collected regarding the area's population and economy. This information will be an input in the development of the parameters for the public participation program. It will also result in the establishment of acceptable regional and local population and economic forecasts as a framework for waterfront planning.

A major factor in the concept preparation will be to evaluate the effects on the continued economic growth of the entire area. To this end, matters related to industry, employment and investment will be thoroughly analyzed.

(v) Recreation

This is a key element of the project, and study operations will extend from overall present and future needs for recreation facilities in the study area, to the cost and design implications of different forms of waterfront recreational facilities. Recreational demand is closely related to the available opportunities for recreational activities and programs. The research in this regard will therefore be closely linked with the research of the waterfront's physical environment and landscape.

(vi) History of Waterfront Development

This section will consist of a review and interpretation of the historical record of the development of the waterfront of the western end of Lake Ontario. The review will cover the area's growth, the development of harbours and waterfront facilities and the history of current municipal issues. Also included will be an inventory and analysis of historical sites and buildings.

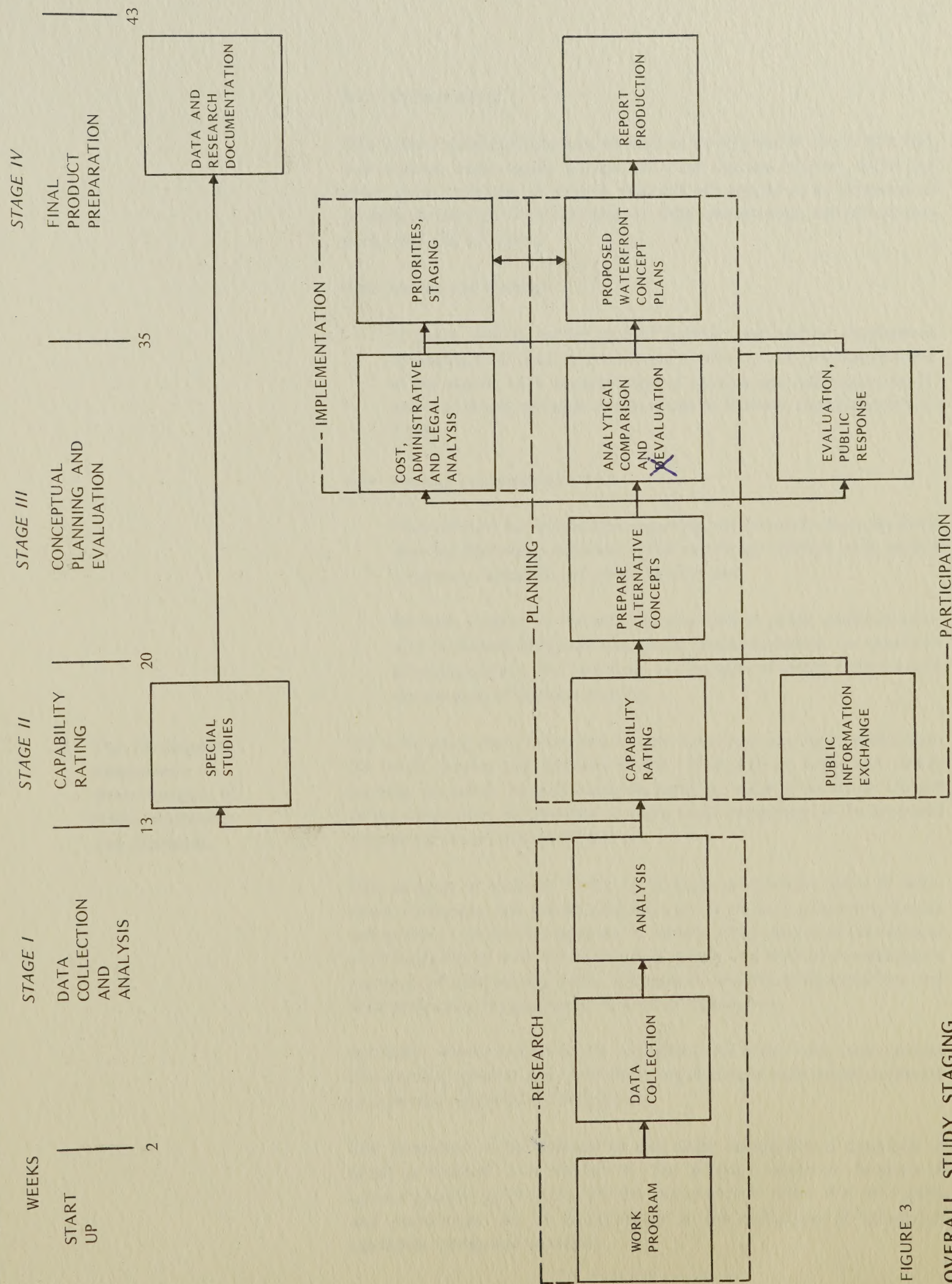


FIGURE 3
OVERALL STUDY STAGING

(vii) Infrastructure

This covers such local and area services as transportation and traffic control systems, water supply sewage and waste disposal systems, power and other public utilities. In general, research will consist of an inventory of existing services and a compilation of need and use data, and official programs and commitments.

(viii) Marine and Harbour

A study will be carried out of harbour and related installations throughout the area, and their relationship to the continued growth of the region, with consideration of harbour use and requirements, and the future physical development of harbour and industrial facilities.

(ix) Finance and Administration

This pertains to information regarding the financial resources available for the implementation of the waterfront concept, with respect to sources, amounts and conditions for use.

We also propose to research the structure of public administration and decision-making for waterfront implementation: i.e. locations of responsibility, the functions and linkages of public agencies, and the patterns of decision-making.

**The Participation
Component —
Determination of
Public Attitudes
and Demands**

The conceptual plans developed for the waterfront area must reflect both the needs, desires and attitudes of the community at large, and, where possible, reconcile the conflicting demands by major interests on the use of the waterfront. Accordingly, a major study component is the proposed program of community participation.

This program is twofold. Firstly, it includes an extensive series of interviews, exchanges, and public meetings with all relevant community bodies and groups. This will be designed to achieve a high degree of information and idea exchange with the community at large and with citizen groups, in a process of determining public attitudes to waterfront development and their preference in response to conceptual alternatives.

Secondly, where necessary, the consultant will work with study groups representing agencies and community organizations with special authority or interest in waterfront development.

The procedure to be followed in this study component is described in detail in Chapter 2 of Section B. The program would be designed to achieve positive participation by the community in order that their goals and preferences can be incorporated in the evaluation of waterfront capability ratings and concepts.

The Planning
Component —
Synthesis and
Preliminary Concepts

This program is intended to generate a climate of community acceptance of the concept, and to foster a continued public interest in the waterfront well beyond the completion of this study.

The basis for decisions made concerning the best use of waterfront land must be the assessment and integration of the many factors bearing upon the subject. Many of these have been studied separately in the earlier components of Research and Public Participation. These must be reviewed in the context of the inherent history and future of the community.

Our objective in this phase of the study is to develop a system with which to evaluate the relative feasibility of various alternative uses for every part of the waterfront. This system will be the basis for preparing waterfront concepts, but it will also be of continuing value to the relevant decision-makers who are from time to time responsible for the creation of implementation plans.

In this context we propose to prepare capability ratings for each part of the waterfront (land and water). On the basis of research described in Section 1 of this Chapter, we will identify the different uses of each area of land or water, and set out the implication of each use in such terms as cost, its need and acceptability by various groups of the community and other relationships and consequences.

The capability ratings of individual parts of the waterfront will permit us to develop preliminary concepts for progressively larger areas. These will in turn provide us with an analytical tool, in that we can then evaluate the relationships between, and implications of, alternative combinations of waterfront uses.

In this phase of the study, the planning and public participation components will become progressively integrated. We propose to present preliminary alternative concepts to the public at large and to a variety of community groups to test their acceptability and to obtain suggestions for different uses or approaches.

In this process we will prepare and present to the public concepts based on a variety of criteria; e.g. previously obtained indications of public or agency preferences; environmental capabilities; local and regional development patterns and pressures; and economic requirements. These different criteria may not always at this stage be mutually compatible, but the purpose is to explore all ideas and potentials, so that feasible and acceptable concepts may gradually be developed.

The responses we obtain from these public evaluations and discussions will subsequently form an input in refining the capability ratings, concepts and implementation programs to be presented at the end of the study.

The Implementation
Component –
Concepts and
Program
Recommendations

In this phase we propose to prepare the final product of the study, with particular emphasis on preparing recommendations regarding the means of implementing the conceptual waterfront plan.

As a result of the comprehensive evaluation of a broad range of alternatives carried out in the Planning Component of the study, we anticipate that a limited number of concepts which are both viable and generally acceptable will emerge. In the Implementation Component we propose to study the specific requirements to implement these concepts. These studies will cover the capabilities of the communities and agencies to support the forms and levels of development considered.

Subjects to be reviewed will include the financial resources available to the area governments, the respective roles of the private and public sectors, the administrative requirements, continued public involvement, and matters related to land ownership and acquisition etc.

The major elements of the study's final product will be: -

- i) Capability Ratings for each zone of the waterfront, in a form to permit the continuing evaluation of the relative feasibility and consequences of a number of different uses for any part of the waterfront.
- ii) Alternative Concepts for the waterfront as a whole and for its several sectors, showing development patterns which most closely meet several combinations of goals and criteria determined in the course of the study; most of the uses shown in these concepts will have relatively high capability ratings; we envision that these concepts will give policy guidance to the agencies responsible for implementation, but changes to the concepts can from time to time be considered on the basis of the capability ratings.
- iii) Alternative Staging Programs, indicating several sequences in which the concepts can be implemented over time; and recommendations regarding the preparation of detailed sector plans and implementation programs.
- iv) Administrative Recommendations related to changes to the current structure of public administrative responsibilities and functions, to facilitate implementation of the waterfront concepts.
- v) Financing Recommendations, related to methods and sources of public and private financing to accomplish an economical and equitable program of implementation.
- vi) Public Participation Recommendations related to the methods to ensure continued public involvement in and support for the waterfront implementation program.

3. STUDY ORGANIZATION AND OPERATIONS

In accordance with the substantial project needs and the relatively limited time allotted, we propose a study organization with specific staff assignments and functions as follows.

Organization

i) Project Management

Project Director,
P.E. Wade, (Acres), Senior Planning Engineer,
responsible for study procedure and primary client liaison.

Project Coordinator,
C.J. Prinsloo, (PPAL), Senior Planning Engineer
responsible for control and management of study operations.

ii) Research Component

The data compilation and analysis in the nine major subject areas will be the responsibility of the following personnel. Throughout the study these persons will serve as the expert advisors and will be responsible for technical methodology, criteria and specific interpretation within their subject areas. In many cases such matters would be developed in discussion with the Committees.

Environmental Research,
P.J. Denison, (Acres), Senior Environmental Research Scientist

Landscape Studies,
W.H. Kehm, (PPAL), Chief Landscape Architect

Land Use and Planning,
M.W. Dake, (PPAL), Chief Planner

Economic, Industrial and Demographic Studies,
P.D. Love, (Acres), Land Economist

Recreation,
R.E. Watts, (PPAL), Senior Recreation Planner

History of Waterfront Development,
R.A.C. Bramley, (PPAL), Senior Planner

Infrastructure, (Transportation, Public Utilities)
P.E. Wade, (Acres), Senior Planning Engineer

Marine and Harbour,
C.J. Prinsloo, (PPAL), Senior Marine Engineer

Financial and Administrative Studies
D.R. Flood, (PPAL), Senior Planner

The above persons will have responsibility for research activity in their respective areas, in most cases with the assistance of professional specialists. Specific staff assignments in these areas are described in the extended subject writeups in Section B.

A schedule of staff participation in the major study components is shown in Figure 4. This diagram relates staff involvement on a time basis to the major stages of the study program as shown in Figure 3.

Curriculum vitae of the study staff members and other available personnel are appended in alphabetical order at the back of the proposal.

iii) Public Participation Component

This projects phase will come under the direction and responsibility of Dr. D. M. Connor. Professional staff from the two firms will participate in certain areas of this program as required. As well, professional social research staff will be employed to assist Dr. Connor on important elements of the program.

iv) Planning Component

The steps of rating the capability of waterfront zones and preparing, evaluating and refining waterfront concept plans, will be carried out in part by most of the persons listed above. However, in order to ensure attention to the needs of overall and sectoral planning, the following group of professionals will be primarily responsible for the coordination and documentation of the planning component.

M.W. Dake (PPAL), Senior Planner
 R.A. Bramley (PPAL), Senior Planner
 B. Meredith (Acres), Senior Architect/Planner
 P.D. Love (Acres), Land Economist
 R.E. Watts (PPAL), Senior Recreation Planner.

v) Implementation Component

As in the Planning Component, the team members responsible for the nine major study subject areas mentioned previously will be involved in the formulation of final concepts and recommendations. The same persons mentioned in Section iv), Planning Component, above, will be primarily responsible for coordination and documentation.

Operations

The success of this study will depend not only on the technical capabilities set out before, but also on the study being carried out within the framework of a carefully determined and monitored detail program as described in Chapter 2 to ensure strict control of study time and study budget.

Location of Operations

It is proposed to open an operational office in the Hamilton/ Burlington area where the main thrust of the work on the study would be carried out. This will place the key team members in close proximity to the sources of data they will be collecting and analysing and will also allow easy access for Committees and other public and private agency representatives to the main consultant study team, throughout the study program.

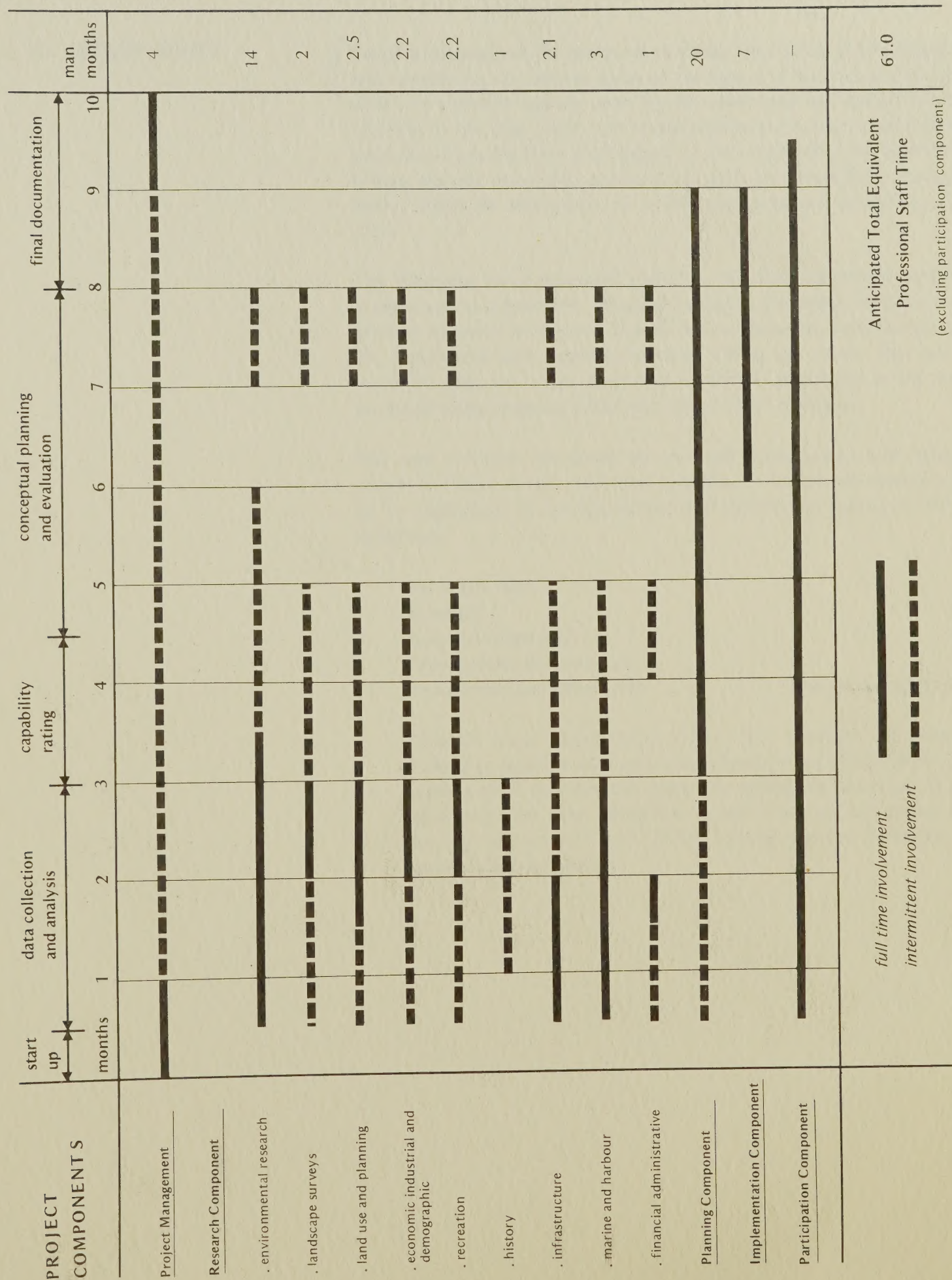
In addition, finite, very specialized items of work would be carried at the offices of the consultant in Niagara Falls or Toronto, where a wider range of in-house support facilities are available to the expert and then be incorporated by the study team in their work.

Committee Involvement

It is visualized that the committees will perform two major functions i.e. one whereby individual committee members will direct the consultant to the sources of research data within the agency they represent and, secondly as the means of guiding the consultant through all the various stages of the work and providing decisions and direction at each stage in the Study where this is required.

In this regard it is recommended that the Committees appoint a full time liaison officer available to the consultant for all day to day contact requirements and to attend all regular weekly consultant progress meetings to enable him to communicate with other committee members at any time on the progress of the study. It is not, however, expected that this liaison officer would be required to participate actively in the work of the consultant.

It is further assumed that although the various participating public agencies and committee members will actively review program elements, there will be no substantive additional involvement other than outlined above.



PROPOSED STAFFING SCHEDULE

FIGURE 4.

4. STUDY COSTS

Specific estimates of the resources necessary for a study of this magnitude and complexity can only be made on the basis of a detailed work program which is mutually agreed upon by the client and his consultant. Such variables as the scale, depth and methods of research, public participation, operational uncertainties with regard to data availability and institutional delays; and the inevitable evolution of goals and procedures during the study, make the submission of a fixed cost estimate unrealistic at this time.

The following list of estimated costs for consulting services by work item is presented as a guideline. We would propose that these amounts should serve as an upset limit which should not be exceeded, with charges made for actual time and expenses incurred during the study. However, we recognize that the client may wish to discuss alterations to the herein proposed study program, which may affect these estimates.

The cost estimates are based on the staff participation time estimates shown in Figure 4, and computed according to the proposed rates quoted in the regulations of the Association of Professional Engineers of Ontario as follows:

Per Diem Rate	
Principal	\$200
Senior Professional	\$150
Intermediate Professionals, Technicians and Other Staff	Two times payroll costs.

"Payroll Cost" shall mean salary plus provision for statutory holidays, vacation with pay, unemployment insurance where applicable, health and medical insurance, group life insurance, pension plan, and sick time allowance. It shall exclude any bonus profit sharing system, and shall be the average for the particular staff classification in question.

Estimated
Project Cost

Research Component

1. Environmental Research (Limnology, Hydraulics, Hydrometeorology, Chemical, Ecological Studies	49,000
2. Landscape Surveys	6,000
3. Land Use and Planning Data	7,000
4. Economic, Industrial and Demographic Studies	6,000
5. Recreation	7,000
6. History of Waterfront Development	2,000
7. Infrastructure	6,000
8. Marine and Harbour	10,000
9. Financial and Administrative Studies	3,000

RESEARCH COMPONENT TOTAL	<u>96,000</u>	96,000
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Planning Component (Zone capability rating, conceptual planning and evaluation)		61,000
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Implementation Component		22,000
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Project Management		15,000
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STUDY SUB - TOTAL	<u>194,000</u>	
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Participation Component (see comment at the end of this chapter)		200,000
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In addition the firm shall be reimbursed for all disbursements and expenses properly incurred (with auto mileage at 12 cents per mile) by firm personnel in the performance of their services.

In addition to these amounts will be the cost of preparing and printing a final report, which is not expected to exceed \$10,000. All expenses properly incurred in the interests of the study (primarily travelling expenses) would be invoiced at cost. These would not be expected to exceed \$10,000. We would suggest that study fees and expenses be invoiced on a monthly basis throughout the project, based on the time and expenses incurred during the particular month.

Design of Public Participation Program

We are conscious of the fact that the Committee wishes the public to make a positive input to the study both in the identification of needs, goals and preferences, and in the process of evaluating alternative concepts. We agree that this will be an important and demanding component of the study, whereby a positive rapport with community elements will be sought in achieving a climate of acceptance for waterfront programs.

We have discussed this subject at length with our consulting sociologist, Dr. D.M. Connor, and with others in this field including Mrs. S.G. Richards of Interthink Ltd., a social research company within the Project Group. We understand that there are a variety of techniques available for public participation programs of this type. Techniques vary from community-wide programs to intensive group techniques. Depending upon the project requirements and the procedures followed, a participation program associated with the waterfront study could range in cost from \$70,000 to \$200,000.

In Section B of this proposal we have set out in detail the program recommended by Dr. D.M. Connor. This approach has been used successfully in the case of urban freeway projects and river basin study, and is being used for major community programs in Ottawa and in British Columbia. We are confident that this type of program will achieve the objective of meaningful public participation.

However, it is our view that it would be premature to design a participation program without first obtaining a more precise understanding of your own requirements and the special needs and characteristics of the study area. Therefore, it is our firm belief that before proceeding with the study we should, together with our sociological advisors, meet with you to discuss this important aspect of the study in detail. In this way we are confident that we can design a social participation program which will meet the needs of the study in all respects.

Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

SECTION B

"STUDY METHODOLOGY"

SECTION B

STUDY METHODOLOGY

INTRODUCTION

The overall procedures outlined in Section A Chapter 2 indicate four main components in the study process.

The purpose of this section of the proposal is to describe in greater detail the content and purpose of each study component and the technical methods to be used.

1. RESEARCH

There are essentially two geographic areas for which data will be collected and analyzed:

General Approach

- i) The Study Area as defined in the terms of reference, i.e. the land within one quarter mile of the Lake Ontario shore plus certain specifically identified other lands; e.g. the logical extension along water courses; and
- ii) the Region adjacent to the Study Area, being those lands which will probably be urbanized during the next few decades.

Data will be collected and analyzed on the basis of a preliminary outline of the reports and working papers which will be produced during the course of the Study; these outlines will be prepared at the outset and progressively refined and detailed as the work proceeds. This will avoid the collection of unnecessary information.

Data and analyses will be systematically plotted, recorded and filed to facilitate up-dating and effective use during the course of implementing the Waterfront Concept.

Initially data will be collected and recorded by type in order to assemble inventories of specific waterfront characteristics, uses, and services. For each category existing growth forecasts and projections will be analyzed and agreement sought from the Committee on acceptable projections (or ranges). Following this in Section B, Chapter 2, a more comprehensive analysis of the inter-relationships between specific uses and their competing demands on space and other resources will be undertaken.

We propose that where ever possible we will make use of data currently available in municipal, provincial and other public agency records and files. Only where these sources prove to lack necessary information will additional data be collected by means of original surveys, interviews and investigations.

Data to be collected and analyzed will as far as possible be confined to that which is necessary to produce the outline Waterfront Concept and an evaluation of the means of implementation. Where this is appropriate, we will use assumptions or estimates to avoid unnecessary expenditures in

time and money, and we will advise the Technical Committee from time to time when this approach appears to be suitable. For example, we do not propose to undertake detailed population analyses and projections for the Region, but will use studies carried out by others and agree with the Committee which projections (or ranges) will be used.

We propose to design a system whereby each item of information can at all times be evaluated and assessed in terms of its relationship with other factors under alternative conditions. For example, let us assume that a manufacturing industry exists on the lakeshore next to a vacant area of land. The evaluation system would enable us to test alternative uses of the vacant land and their effects on the industry and vice versa, as well as on all other relevant physical, social and economic factors which would be affected by alternative uses. The system would be designed to remain operational in the future by enabling the incorporation of new or changed data as the situation along the waterfront evolves.

The data collection, storing and analysis will be such as to facilitate its continued use in the above mentioned evaluation system.

A series of meetings have already been held with officials of various levels of government involved in the Study Area and other quasi-governmental agencies to determine the sources, quality and quantity of published or unpublished data pertaining to the Study. Where available, all relevant reports, statistical data and mapping are already being collected and catalogued.

In addition to identifying data sources these preliminary meetings have enabled members of our team to make themselves known to professional and administrative staff of agencies having an interest in the Waterfront Study and to familiarize themselves with the range and relative importance of various issues affecting waterfront development.

Each research subject is described in three parts; first a description of the scope of the research topics; second a description of the method and purpose of individual analyses and third a list of the personnel from whom the research teams will be drawn. It should not be implied that all these individuals will be involved in the Study, rather that appropriate teams incorporating all necessary skills and expertise will be selected at the commencement of the Study. Reference can be made to individual curricula vitae which for convenience of reference are appended alphabetically at the end of the proposal.

Physical Environment

Research Topics

The initial stage of research on the environment will establish from available data the physical, chemical and biological characteristics of the water/air/land environment in the study region, as well as in those adjacent areas that may significantly affect the study region, namely:

Lake currents;
 lake temperatures and density profiles;
 wave and ice climatology;
 lake bottom topography;
 erosion and sedimentation;
 hydrologic processes in the principal tributaries;
 lake, river and air diffusion processes;
 aqueous and bottom sediment chemistry;
 air chemistry;
 wildlife and fish populations;
 vegetation;
 relationships between water/air/land quality and flora and fauna;

We have immediately available all of the published data on the above areas for investigation, as well as the proceedings of the many conferences concerned with the planning and management of environmental quality in the Great Lakes Basin. The major provincial sources for data, both published and unpublished, are the Ontario Water Resources Commission, The Conservation Authorities Branch, and the Department of Lands and Forests. The major federal sources for data are the several water sector agencies within the Department of the Environment and the International Joint Commission.

Informal discussions with Dr. R. E. Lane, at the Canada Centre for Inland Waters, Burlington, Dr. L. Laking, Royal Botanical Gardens, Hamilton, Mr. D. Matheson, Hamilton Municipal Laboratories, Mr. H. McFarlane, Ontario Air Management Branch, Dr. A. D. Misener, Director of the Great Lakes Institute, University of Toronto (a member of our study team), and Mr. R. Wilcox, Ontario Department of Agriculture and Food, Vineland Research Station, have confirmed that, in addition to the published data and reports, a substantial body of short-term but nonetheless valuable information has been acquired during conduct of research projects carried out in specific areas of the study region. This information is available in files, and the members of our study team will make a concerted effort to retrieve the data pertinent to this project.

Methods and Purpose of Analysis

Interactions among the basic components of the overall environment will be examined and defined in terms of their physical, chemical and biological makeups. The time-varying nature of the environmental characteristics will be assessed according to type of season and type of year, and any identifiable long-term trends or sudden changes that may have occurred as a result of man's activities will be documented.

Physical Processes

Those natural processes affecting the physical features of the shoreline and its related land areas will be analyzed to provide a theoretical and/or empirical relationship with historically observed changes.

Calibration of the theoretical equations to allow their application in specific areas of the study region will require input of actual measurements of the magnitude of their effects or, failing directly measured data, indirect estimates of the magnitudes to permit empirical calibration. The techniques available for such analyses are well documented in the literature on river and lake physical processes (limnology and hydrology) and are not detailed here. The accuracy with which the coefficients in the equations can be designated is a function of the number of measurements available and their accuracies. Based on our general knowledge of the data available, reasonably accurate calibration of these physical models should be achieved.

It is expected that sufficient information will be available to permit development of analytical procedures for the prediction of the impacts on the environment of alternative concepts for development of the waterfront and related land areas.

Studies are envisaged on the following work elements:

Limnology

- Analyze available data on monthly or seasonal lake current patterns to define impact of currents on proposed shore facilities, shoreline erosion and thermal or other effluents.
- Update available charts on lake bottom topography with all available new data.
- Analyze data on lake temperature patterns to define typical locations and effects of the thermocline and thermal bar. Develop typical seasonal lake temperature patterns to evaluate feasibility of water-based recreation.
- Consider input of thermal discharges on lake currents and assess influence of such discharges on the shoreline, thermocline and shore biology.
- Evaluate concept of using solar heating to provide localized warm areas suitable for swimming and other water-based recreation.

Hydraulic Studies

- Analyze wave climate by month or season for each sector of the waterfront, to derive probability distributions of design wave conditions. Make recommendations on design wave criteria for permanent capital works and other beach facilities. In the absence of wave measurements, compute the wave climate from wind data for various wind directions and durations.
- Analyze ice regime by sectors to evaluate effect of ice in promoting or inhibiting shore erosion.
- Analyze present pattern of littoral drift to determine causative factors, effect on present shoreline configuration and probable future effects.

- Erosion and sedimentation along the shoreline result primarily from the action of littoral drift, discussed above, but in the lake or on the land other processes are dominant. Patterns of erosion and sedimentation on land or under water will be examined to determine causative or dominant factors.
- determine effect of lake levels on erosion patterns and make a projection of future lake levels.
- conceive typical shore protection devices such as groynes and breakwaters.

Hydrometeorology

- Obtain and update meteorological data describing the local climate, including wind, rainfall, snowfall, air temperature, sunshine and humidity.
- Determine rainfall, snowfall and runoff patterns in the streams traversing the shore area and hinterland
- Examine response of these streams to heavy rainfall and snowmelt to determine flooding characteristics.
- Prepare design criteria with respect to floods for facilities placed in stream valleys.
- Examine erosion patterns and sediment transportation capabilities of streams entering the shore zone to evaluate the influence of these factors on valley utilization and also upon lake processes.

Geology

- Documentation of surficial geology of the area, using available maps and other published and unpublished data to evaluate nature and characteristics of lake bed, shoreline and hinterland soils and subsoils.

Chemical Processes

Several of the parameters and properties are grouped under this heading, because their principal significance relates to "environmental quality" in its broadest sense, and hence form inputs to the section following on biological processes.

The processes describing the transport and diffusion of wasteloads discharged to watercourses (and to the atmosphere) including warm water discharges, are the principal cases in point. Biochemical oxygen demands exerted by such wasteloads as they are transported and diffused under the action of the physical processes described above will determine important measures of water quality. Such oxygen demand will be affected by water temperatures and hence by the transport and diffusion of warm water discharges, and these latter are by themselves important factors in biological processes.

Considering those chemical processes related to an assessment of water quality conditions in various areas of the study region as having first order priority, it will be necessary to identify major sources of wasteloads into the lake proper, the harbour and their tributaries. Generalized transport and diffusion equations (including re-aeration and where possible photo-synthetic re-actions) of the modified Streeter Phelps form can then be calibrated against existing water quality measurements. It is expected that the calibrated equations will be available in many cases from the Ontario Water Resources Commission. Such equations can then be applied on a monthly or seasonal basis, over the range of climatic conditions affecting the water regimes of the study region, to assess the suitability of developing various areas for different types of recreational, commercial, industrial and residential use. It should be emphasized that we are aware of the extensive provincial and local investigations on water pollution, its causes and control, that have been carried out. Wherever possible these will be used as direct input to the evaluation of the impacts of alternative concepts for development of the study region on the quality of water as it relates to the uses planned.

In addition to an understanding of the chemistry of the water bodies themselves, it will be necessary to form an appreciation of the extent and importance of bottom sediment contamination, particularly in the harbour area. The influence of such sediment contamination on the quality of the water could significantly affect some potential uses of that water. In addition, dredging of bottom sediments to maintain channel and port depths needed for navigation raises a question of the safe disposal of the dredged material depending on the nature and degree of possible contamination. Any comprehensive plan, albeit conceptual in nature, must face this problem.

The transport, diffusion, chemical behaviour and deposition of pollutants emitted to the atmosphere are of more direct concern to the health of vegetation and hence of the wildlife of the region. Air quality models have been developed and put to both operational and planning use for many urban areas, including a simulation model for Metropolitan Toronto. The Ontario Air Management Branch has made a start on the development of a similar model for Hamilton.

Biological Processes

Much is now known on fish and wildlife populations that both inhabit and migrate to the study region, and on their sources for food and requirements for spawning and breeding habitats. Some information also exists on changes in these populations that have occurred as a result of large-scale natural and man-made phenomena. As always, major difficulties are inherent in attempts to develop models that will reliably predict the long term effects of significant alterations that may be imposed by future developments in the study region on the quality of the water/air/land environment. There are, however, some general principles that can be applied once the major fish and wildlife species and their food chains have

been identified and located geographically. There appears to be sufficient data available to adequately accomplish this latter task. Effluent discharge and water quality standards and air emissions and air quality standards established by the O.W.R.C. and O.A.M.B. to a large extent recognize and incorporate the principles mentioned. Certain sensitive species of fish and wildlife and some forms of vegetation may require detailed local consideration and protection from both air and water pollution, according to the alternative concepts for regional development that emerge during conduct of the study.

Research Team

Mr. P.J. Denison	Air-water, air-land processes air quality	ACRES
Mr. C.H. Atkinson	Hydraulics	ACRES
Dr. I.K. Hill	Fluid Mechanics, bottom Sediment	ACRES
Mr. T.M. Lavender	Discharge Plumes	ACRES
Mr. J.E. Cowley	Surface Water and Shoreline Processes	ACRES
Mr. R.P. Benson	Surface and Sub Aqueous geology, Soil mechanics	ACRES
Mr. T.J. Bradshaw	Surficial and underground drainage	ACRES
Mr. C.W. Hills	Water quality and assessments	ACRES
Dr. M.A. Rashid	of potential developments on	ACRES
Mr. K.F. Heatherington	water quality	ACRES
Dr. A.M. Hill	Biological processes	ACRES
Mr. W.H. Kehm	Physiography, soils and climate,	PPAL
Mr. V.R. Olsen	vegetation and wildlife	PPAL

Specialist Consultants

Dr. A.D. Misener	Limnologist	Director, Great Lakes Institute
Dr. R.S. Dorney	Ecologist	University of Waterloo

Landscape

Research Topics

In terms of data collection the landscape component will draw to a large extent on the physical environment inventory. Additional data relating to soil types, plant and wildlife associations will also be collected.

Two basic inventories, a Physical Features Inventory and a Historical/Cultural Inventory are proposed.

The physical features inventory will involve graphically plotting all important landscape features — i.e. ravines, waterfalls, bluffs, marshes. The historical and cultural inventory will identify historically and culturally significant buildings, civil works and landscape in a similar manner to the physical features inventory.

Methods and Purpose of Analysis

The physical features and historical/cultural inventories will be analyzed to determine the following:

Natural Landscape Units

Their intrinsic landscape qualities and capabilities will be evaluated for agriculture, forestry, recreation, wildlife and urbanization. The Province of Ontario Land Classification System will be referred to as a basis and augmented by other physical data obtained from physical environment research. This analysis will identify the range of factors which may endanger specific landscape units whilst also determining the limits to which land can be utilized. Sensitive soil types, steep, erodible slopes and flood plains which should not be urbanized, but rather be kept as part of a regional open space system are examples of the potential planning inputs from this phase of study.

Visual Aesthetic Qualities

The aesthetic qualities of the land and waterscapes will be graphically plotted to identify vista lines, landscape features and their characteristics, and areas of historic significance. With this information the potential for restoring or preserving these aspects of our natural and cultural heritage can be evaluated. Recommendations on the steps to be taken to conserve them for the future will be made which may have implications for developing land management policies, scenic easements, management programs, governmental organization and land use planning.

A matrix identifying all units and features on a rated basis will provide another input to the planning process when alternate concepts are being evaluated. For example, areas of significance to the public because of scenic beauty or history can be determined and preserved and points of

potential conflict can be isolated. Frequently it is in these areas of significant landscape character and high aesthetic value that conflicts of use occur.

Research Team to be selected from

W.H. Kehm	Chief Landscape Architect	PPAL
J.D. Consolati	Senior Landscape Architect	PPAL
V.R. Olsen	Senior Landscape Architect	PPAL
B. Meredith	Architect Planner	ACRES

Land Use and Planning

Research Topics

In order to understand the implications of the current distribution of land uses along the waterfront and to identify the conflicts and potentials created by the existing use structure, the following data will be collected, evaluated and recorded:

- existing land uses and community facilities;
- existing subdivision patterns and residential densities;
- property ownership (major holdings, public or private);
- Official Plans and Zoning By-Laws;
- plans, programs and standards of other public agencies;
- committed public and private development projects and their expected time of implementation, e.g. municipal five-year capital works programs;
- physical condition and aesthetic quality of existing development.

Methods and Purpose of Analysis

This data will be analyzed initially in the following context.

- Identification of potential opportunities and constraints for improving and changing the existing land use pattern.
- The degree to which existing land uses have a beneficial or detrimental effect on each other.
- The relationships between existing land uses and current official plans and plans of adjoining authorities e.g. Metropolitan Toronto and Niagara Peninsula.
- Identification of development pressures being exerted on different parts of the waterfront.

Research Team to be selected from

M.W. Dake (Co-ordinator)	Chief Planner	PPAL
R.A.C. Bramley	Senior Planner	PPAL
H. Wyne	Senior Planner and Development Economist	PPAL
B. Riera	Senior Planner	PPAL
D.R. Flood	Senior Municipal Planner	PPAL

Economy, Industry
and Demography

Research Topics

The following data will be researched in order to establish the type and degree of economic pressures which will be executed on the waterfront in the future.

- Type and location of industry and other places of employment.
- Estimates by various public agencies of anticipated changes in the current pattern of employment places in terms of growth, distribution, timing, labour force and infrastructure requirements.
- Effects of current Federal and Provincial economic policies and industrial incentives on type and distribution of industry, labour requirements (male/female ratios) and income levels.
- Population size and distribution in the Study Area and the Region.
- Recent trends in population growth and distribution.
- Population characteristics in the form of income and social structure patterns.
- Population growth and distribution estimates prepared by various public agencies.

Methods and Purpose of Analysis

- Determination of the relationships between places of employment and the natural environment.
- The degree to which existing and potential industries require waterfront locations (in terms of water supply and water borne transportation).
- Relationships between existing and anticipated places of employment and public attitudes regarding their suitability.
- The opportunities and constraints for changing the existing pattern of waterfront oriented places of employment.
- With respect to population the analyses will primarily be centred upon the determination of future growth and distribution estimates as one of the bases for the subsequent allocation of land uses, facilities and infrastructure.

Research Team to be selected from

P.D. Love (Co-ordinator)	Senior Land Economist	ACRES
R.B. Irvine	Senior Economist	ACRES
M.W. Dake	Chief Planner	PPAL
H. Wyne	Development Economist	PPAL
R.A.C. Bramley	Senior Planner	PPAL
Special Consultant		
Dr. R.S. Thoman	Geographer and Regional Development Planner	

Recreation

In order to evaluate the capability of the waterfront to satisfy existing and potential recreation demands the following data and information will be researched:

- Environmental (water, land and vegetation) capacities and potentials for recreation;
- Type, location and other characteristics of existing recreation facilities;
- Characteristics of existing recreation programs;
- Current utilization rates of recreation facilities and programs; and
- The public's attitudes, requirements and desires for recreation.

Information regarding the area's natural capabilities will be obtained from the overall environmental investigations carried out by other members of the study team, augmented by a review of the recreation land capability maps prepared by the Department of Lands and Forests, and by a thorough and specific on-site survey by recreational specialists.

Information regarding public requirements will be obtained through interviews with local Directors of Parks and Recreation and other involved groups and individuals.

Methods and Purpose of Analysis

To assist in the analysis of data we will develop a comprehensive list of the recreational activities and interests of our contemporary urban society. Each part of the waterfront will be evaluated to determine its optimum capabilities with respect of these activities and interests, taking the natural features and current and potential surrounding development into account. By this method we will be able to determine the optimum recreational uses for each part of the waterfront (including off-shore water and in-land water courses and ravines), as well as the relationships between these uses

and surrounding development. In addition, we will be able to identify alternative potential uses in order of opportunity.

On the basis of the above outlined recreational capability analysis, we will be able to evaluate the suitability of current recreational facilities in relation to public requirements.

In assessing the recreational aspects of the waterfront we will take into consideration the requirements of the residents of the immediately surrounding urban areas, of the population living within "day-trip" distance from the waterfront, and of the tourists who pass through the area. Each of these groups have different (and sometimes conflicting) needs and interests which will have to be compared and evaluated.

Research Team to be selected from

R.E. Watts (Co-ordinator)	Senior Recreation Planner	PPAL
G. Yost	Principal Planner (Regional Planning Recreation and Tourism)	PPAL
W.H. Kehm	Chief Landscape Architect	PPAL
J.D. Consolati	Senior Landscape Architect	PPAL
V. Olsen	Senior Landscape Architect	PPAL
A. Koves	Recreation Economist	ACRES

Special Consultant

Dr. R.I. Wolfe	Geographer Recreation and Tourism	York University
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History

Research Topics

The purpose of this activity is two-fold; firstly, to outline the principal historical events which resulted in the present development pattern along the lakeshore, and secondly, to identify existing sites, buildings and other factors which are of historic significance.

The data will be collected from the relevant literature, through interviews with representatives of historical societies and other knowledgeable persons, and by means of on-site investigations.

Methods and Purpose of Analysis

Where possible any current areas of public sensitivity with historic origins will be identified e.g. local rights of access to land or water.

Research Team

R.A.C. Bramley (Co-ordinator)	Senior Planner	P.P.A.L.
R.E. Alexander	Senior Architect (Restoration)	P.P.A.L.
R.E. Watts	Senior Planner	P.P.A.L.

Infrastructure

Research Topics

The objective in undertaking research studies in the area of regional and community infrastructure facilities is to record the location and operating conditions of existing facilities, plus the development commitments and proposals of the relevant authorities.

Service types included in this category include:

- highway, street and goods movement facilities;
- municipal and transit services;
- rail installations, services, etc.;
- airports, (land and water);
- water supply system;
- sewage and waste treatment systems;
- industrial water and waste treatment processes;
- municipal power systems.

Methods and Purpose of Analysis

Inventory, operating, and forecast information on infrastructure facilities will serve as important reference information for the research and planning analysis of the Waterfront Study:

- they may represent impacts on the environment of the lake and the waterfront in the form of pollution, traffic flows, structural and visual incursions;
- they may represent constraints on possible uses of waterfront zones as a result of the above impacts, or of service inadequacies;
- they may represent service opportunities for waterfront uses in the form of increased accessibility, or as unused service capacity.

Such information will be required as reference material in the steps of capability rating, and conceptual planning and evaluation.

A primary assumption is that no basic research will be done in this area, and that in most cases inventory, operational, demand and planning information will be available from existing governmental sources. These sources include:

- a) Local — industries, utility and transit commissions, municipal, and county governments, conservation authorities.
- b) Provincial — Department of Transportation and Communications,
Department of the Environment
Ontario Water Resources Commission,
Department of Health,
Hydro Electric Power Commission of Ontario.
- c) Federal — Ministry of Transport.

These authorities will be contacted and available reports, statistics and relevant information will be collected and interpreted for use in the waterfront study.

Research Team to be selected from

P.E. Wade	Senior Engineer	ACRES
I.J. Thomas	Senior Transportation Engineer	ACRES
W.O. Billing	Senior Transportation Engineer	P.P.A.L.
A.L. Hayworth	Chief Municipal Engineer	P.P.A.L.
K. Holland	Senior Municipal Engineer	P.P.A.L.
W. Brownlee	Senior Utility Engineer	ACRES

Where necessary special advice can be obtained from the following staff:

D.J. MacKay	Senior Engineer (roads and rail)	ACRES
A.E. Kerridge	Senior Engineer (waste treatment)	ACRES
B.G. Lang	Senior Engineer (water purification and waste treatment)	ACRES

Marine and Harbour

Research Topics

The key aspect of this element of the study will obviously relate to Hamilton Harbour. The City of Hamilton in broad terms depends on the steel industry and this industry has essentially located in the Hamilton area as a consequence of the existence of Hamilton Harbour. The industry plays a vital role in the community through the provision of jobs and in the effect it has of keeping down the residential tax base.

If this industry is to grow there will be an inter-related need for the harbour to grow. Alternatively if the development of the harbour is restricted in the future there will be a need in Hamilton to develop diversified industry. In carrying out this particular aspect of the study careful consideration will have to be given to the port function in relation to the associated industrial activities.

The first step will relate to the collection and evaluation of all the factual data relating to the Hamilton Harbour activities. In general this data will essentially be obtained from existing records and be carefully documented in an organized manner under definite categories as described below including the necessary cross-referencing of the data between the categories.

Jurisdictional and Legal Aspects

In this category data relating to the current policy and role of the harbour as expressed by Federal, Provincial and Municipal bodies including the relationship of the port within the area and the relationship of the port to the seaway system; the current and projected goals of the Hamilton Harbour Commission; a land ownership map indicating all private and public lands and water lots including any easements and concessions in the area considered as Hamilton Harbour, as well as the exact boundaries of the Hamilton Harbour Commission land; a jurisdictional map indicating boundaries of jurisdiction of agencies over land and water areas in Hamilton Harbour, with separate maps indicating jurisdiction regarding policy, building controls, zoning controls, planning controls, etc.; data summarizing the Hamilton Harbour Commission's controls in regard to pollution, policing, customs, planning committees, building committees,

procedures of planning and approvals, building restrictions, particularly in terms of how these regulations are set and administered, will be gathered.

General Economic Information

Data which will be accumulated relative to the economic service to the City and region; general financial and tax and investment role; labour force and employment; real estate value; etc.

Functional Uses and Plans

Data will be collected relating to existing and currently planned land uses; existing and currently planned water uses; port data regarding cargoes, volumes, types, growth, industrial needs, etc.; transportation modes; zoning and building by-laws; future growth plans for the port and region; seaway trends; existing physical facilities, etc.

Land and Water Capabilities

The following items will be documented; watershed characteristics; navigational requirements; climatology; hydraulic features; soils; atmospheric characteristics; ecological factors; etc.

Methods and Purpose of Analysis

The data accumulated will be used as a basis for projecting the growth of the port area in relation to the expressed policies of the various agencies involved and in relation to the economic and development policy of the City and region including the anticipated growth and changes in the seaway transportation system.

These projections would relate to the categories of the data bank and would provide a basis of establishing goals, restraints and priorities. In addition they would provide information regarding the economic role of the port in relation to employment, real estate, transportation, taxes, etc.; the trend of the port development; long term uses and special requirements; the demand for services by the City, region, industry and government; etc. and will assist in determining the physical parameters and/or restraints to enable a suitable balance to be determined in connection with land and water capability.

Research Team to be selected from

C.J. Prinsloo (Co-ordinator)	Senior Civil Engineer	PPAL
		PPAL
T.R. Smith	Senior Planning Engineer	
R.L. Thomson	Senior Civil Engineer	PPAL
H. Wyne	Senior Planner and Development Economist	PPAL
C. Atkinson	Senior Hydraulic Engineer	ACRES
J.M. Campbell	Senior Civil Engineer	ACRES
T.J. Sluyster	Senior Marine Engineer	ACRES

Special Consultant

Dr. G.E. Jarlan	(Consultant Hydraulic and Port Development Expert)	PPAL
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Administration
and Finance

Methods and Purpose of Analysis

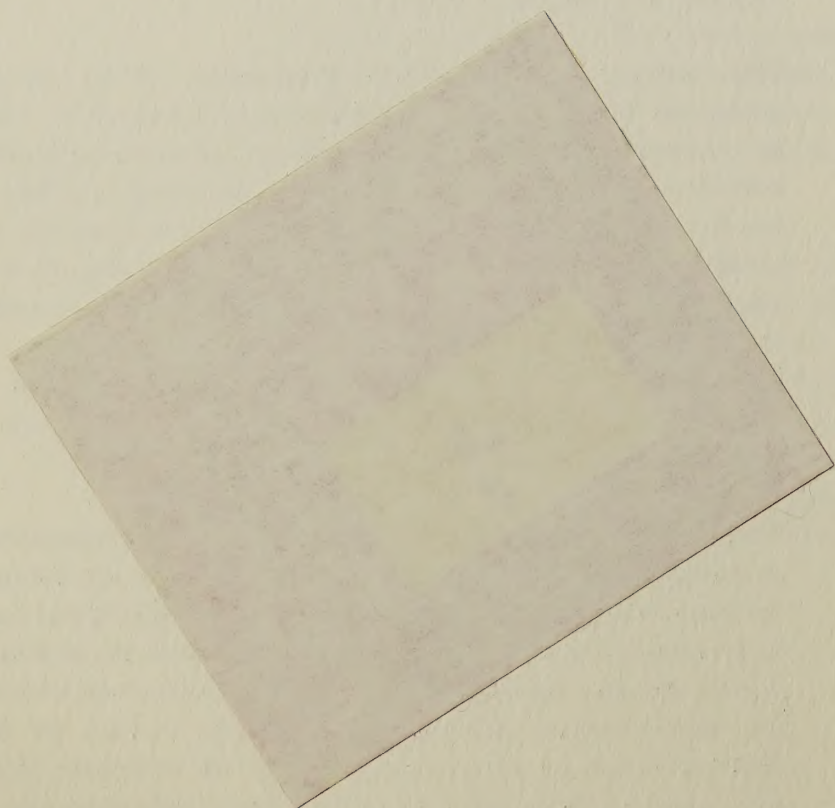
This activity pertains to the preparation of an inventory of the governmental and quasi-governmental agencies which are concerned with or responsible for the planning, control and implementation of matters related to the Waterfront Concept. It is intended to define the different involvement, responsibilities, relationships and channels of communication, for the purpose of defining and analyzing their present and anticipated suitability to achieve the objectives of the Concept.

This information will be collected from documentation and through interviews. The product will essentially be an organization chart and a written analysis.

With regard to financial resources it is intended to determine the current or potential sources and availability of funds for the implementation of the Waterfront Concept. We realize that the availability of funds is subject to continuous change and the principal objective is therefore to design a system whereby the relevant public agencies may from time to time assess the impact which such changes are likely to have on the successful implementation of waterfront proposals. We anticipate that this system will enable us to establish financial criteria, indicating how effective the present funding arrangements are and how they might be improved. This basic funding structure could then be periodically updated to take account of changing circumstances as implementation proceeds.

Research Team to be selected from

D.R. Flood (Co-ordinator)	Senior Municipal Planner	PPAL
P.D. Love	Land Economist	ACRES
A. Koves	Recreation Economist	ACRES
B. Riera	Senior Planner	PPAL
J. Head	Senior Economist	ACRES



2. PARTICIPATION

The Nature of Public Participation

This chapter outlines our understanding of public participation as a constructive component in the total planning process needed to meet the objectives of the client, the rationale for public participation and the core elements of the public participation program.

The public always participates in major decisions which people feel are important to them — but too often this participation is too little, too late and too negative. Planners can therefore hardly choose whether or not to have public participation, but they can influence it to take a positive character.

Public participation is a systematic process which provides an opportunity for citizens, planners, elected representatives and members of relevant area agencies to share their experience, knowledge, goals and energy in defining waterfront development concepts which reflect their knowledge and best judgement at this time, and which are understood and actively supported by most of those affected by it.

Elements of Proposed Program

This outline is based upon current knowledge of the area, its people, and its institutions and as in any responsive program, is subject to revisions as new information is obtained and new developments occur. The concurrence of the Technical Committee at the meeting of January 13 to modify, where necessary, the number of public meetings referred to in the terms of reference is recognized in the following program, which includes a variety of interaction techniques.

1. Introduction and Start-Up Phase (one month)

Recruit, select and orient fieldstaff.

Prepare introductory brochure for mailing and use with initial contacts.

2. Data Collection (three months)

Field staff will contact key people and organizations to discover the character of the communities, citizens' goals and their implications for the project concerning recreation, environment etc.; local issues, and knowledge of study subjects important to waterfront decisions.

Participation programs will be adjusted to suit the character and conditions of the different waterfront sectors and communities. In certain cases (for example, the Hamilton waterfront area), consideration will be given for organizing working groups made up representatives of key area organizations and of the Committees. Such groups will permit exchange between these parties and the consultant in reviewing the feasibility of different waterfront concepts.

3. Information Exchange (four months)

Following a preview by the Committee and a briefing meeting for elected representatives and their guests, this phase would commence.

Background data on study subjects assembled by the research team, together with several known alternative futures for the waterfront, will be summarized in a tabloid newspaper supplement distributed through the Saturday editions of the area press. Assistance will be given to radio and television stations to foster complete coverage, including some preliminary advertising to alert citizens to the forthcoming publication.

Contents would include the purpose of the study and background data on core subjects (e.g. population, land use etc. and some lakefront uses already proposed). In the final half page, readers will be invited to:

- (a) place priorities on a list of criteria, identified by field staff at local meetings, which respondents feel should be employed in deciding the best use of the area;
- (b) suggest alternative solutions either individually or through their local organizations preparing a written proposal;
- (c) note their name and location.

An incubation period of two weeks will be allowed before the deadline for mailing individual responses; a further four weeks will be allowed for group presentations.

To reduce demands on the study office, some kits of basic background material would be provided to interested groups and placed in portable reference centres located in local body offices and/or public libraries.

Responses, individual and group, would be tabulated by areas, summarized, passed to the planning team, previewed by the Committee and shared with the public through the media. The constructive discussion of the results between various organizations would be fostered according to the issues raised and the parties interested.

4. Response to Alternatives (one month)

When the research and planning teams have defined some technically viable alternative solutions, together with descriptive data on each, this material would be previewed and published in a manner similar to step 3 above. In this case readers would be given a simple matrix showing the criteria (plus the average weights they allocated to them earlier) and the alternatives. They would be invited to either simply mark their first, second etc. preference or to do so after working through the matrix.

After a two week incubation period again, individual responses would be mailed in, tabulated by area, summarized and the results passed on to the Committee and the public through the media.

5. Reporting (one month)

Technical and public preference data would be documented for each viable alternative solution, so that the client and other decision-making organizations would be assisted in discharging their responsibilities.

Staff Requirements

To carry out this program effectively requires a high level of staff competence and a level of resources which will ensure that most citizens do have a realistic opportunity to learn about the issues and to express their preference on them. To do less is to invite needless trouble.

The skills required include a proven capacity to carry out community research, group work and adult education. A master's degree in one of the social or behavioral sciences, followed by at least three years' successful field experience, is usually the background of the successful community relations worker. The capacity to focus on interpersonal and intergroup processes is critical to the success of the work of such persons.

In similar programs of public participation in planning, a ratio of one staff person per 100,000 citizens has not been exceeded. In this instance, we believe that one community relations worker for each of the three study sections, working full time with the team leader of that sector as occasions warrant, will provide sufficient coverage.

An interpretive writer will be required on a half time basis to prepare material for public use and to co-ordinate information for the media. Statistical clerks will be obtained as needed to tabulate the responses indicating public preference.

3. PLANNING

Methodology

In the research phase of the Waterfront Study all relevant data collection and analysis has taken place for each individual component related to the Waterfront. These will now be synthesized and comprehensive analyses undertaken to determine land capability and the present and future relationships between all the components. The objective will be to determine the overall implications and effects of alternative waterfront development concepts and programs.

The sequence of operations involved in this process is illustrated in Figure 5, and described below.

Analysis and Capability Rating

First we propose to develop a site capability rating system to enable us to determine the optimum use of each part of the waterfront (on the land as well as offshore), as well as to assess the implications of alternative uses for each part. We envision that this system will permit us to define a range of possible uses for each site on the waterfront on bases such as the following:

the natural environmental characteristics of the land and water (i.e. water depths and currents may suggest the possibility of creating an island, beach or marina; topography, vegetation or drainage may suggest potential for a conservation area, etc.);

existing surrounding development and infra-structure (i.e. the existence of uses and community facilities with surplus capacity may suggest additional low density residential uses; existing uses with inadequate parks may suggest a new park or playground, etc.);

existing land ownership patterns (i.e. a relatively large parcel of vacant land in single ownership may suggest realistic opportunities for redevelopment);

existing municipal and/or provincial plans, programs and priorities; including the Toronto-Centred Regional Plan, Metropolitan Toronto Waterfront Plan and plans for the Niagara Escarpment;

economic values of the land;

accessibility of the site;

the degree to which various uses for the site will beneficially or detrimentally affect existing or future surrounding uses;

the degree to which various uses for the site will beneficially or detrimentally affect the area's economy.

In this manner we propose to identify each part of the waterfront by means of symbols to indicate its capability rating. We anticipate that this will suggest several potential uses for each site, together with the implications of choosing among the different alternatives. This will give the

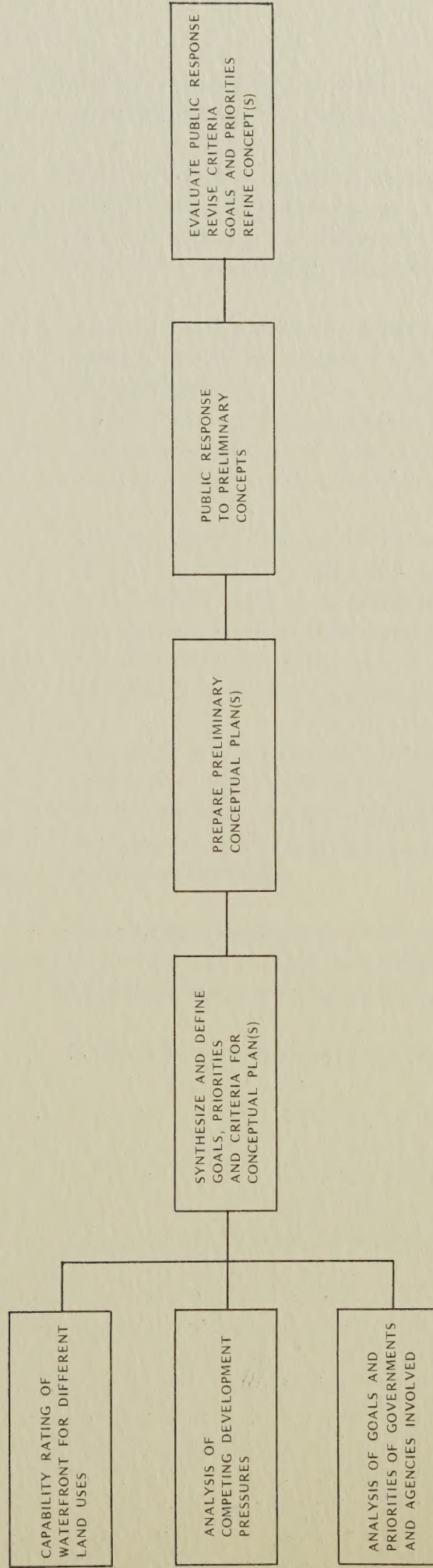


FIGURE 5

agencies responsible for implementation the opportunity to select the most appropriate use at whatever time such a decision is to be made.

On the basis of our analyses of land capability, development pressures and various agency requirements we will establish a set of goals, criteria and priorities which in our judgment come nearest to satisfying the identified needs and demands of the Study Area.

Preliminary Concept

Those goals, priorities and criteria will form the basis of our preliminary concept of how the waterfront should be developed. In certain sectors we anticipate that there will be a range of feasible alternative uses. The merits and shortcomings of each alternate use, both in local and regional terms, will be documented in order that the Committees and the public can evaluate the options in the light of their own aspirations and goals.

The preliminary concept will be prepared in the form of maps and text. We anticipate that the maps will pertain to the three sectors identified in the Client's original terms of reference. Maps will be prepared to show the concept itself, as well as the relevant factors, upon which it will be based. The text will explain the concept and its bases, as well as the relevant background research and analyses.

Concept Refinement

The public response to the preliminary concept, which will be obtained through the public participation program, will form the major input into the process of revising the various goals, criteria and priorities identified in the research and analysis program and in the subsequent refinement of the waterfront concept(s).

This phase of the project will be co-ordinated by a small team of specialists in land use planning and project synthesis. They will be assisted as required by other members of the overall study team.

The personnel primarily responsible for this phase will be:

M.W. Dake (PPAL) -
 R.A.C. Bramley (PPAL) -
 R.E. Watts (PPAL) -
 B. Meredith (ACRES) -
 P.D. Love (ACRES) -

4. IMPLEMENTATION

General Outline

Once the preliminary concept has been presented to and commented on by the relevant public agencies and the residents, we anticipate to be in a position to finalize it, together with all the background material, for final presentation to the client.

The purpose of the final concept is to enable all the agencies and groups involved in the waterfront to make appropriate decisions regarding its future use, improvement or change. Because available resources and the priorities will tend to vary continuously, the concept is not intended to be a static master plan, but a dynamic tool which will not become immediately obsolete. It must be sufficiently flexible to be readily adaptable to different situations. It must enable the decision-makers to evaluate alternative approaches from time to time. And it must be a means by which detailed implementation plans can be prepared for each stage which meet the requirements of the future, not simply those of the present.

The final concept will recommend the manner in which the waterfront could be developed, together with feasible alternatives and the information enabling the most desirable alternative to be selected now or in the future. The client will be in a position to evaluate alternative development proposals for various parts of the waterfront by means of the capability ratings system, backed up by all the research and analysis material to be supplied by the consultant.

During the course of the study the consultant will have presented his recommendations with respect to especially urgent waterfront problems. If appropriate, implementation plans for these priority areas will also have been proceeded with.

Priorities and Staging

In addition to the uses, densities, infrastructure and other related factors shown on the final concept, recommended staging plans and programs will be submitted. This will suggest the sequence of priorities for implementation, together with alternatives and the implications of the various alternatives. The staging will be based on current and anticipated needs and demands, economic and technical considerations and on the objective of maintaining a continuing balance of improvements in the different geographic sectors of the waterfront.

Finances

We propose to prepare cost estimates for the various elements and stages of the waterfront concept. Where feasible, these estimates will be related to the availability of financial resources and to the public benefits they are expected to generate.

Administration

We also propose to analyse the different public administrative structures involved in the implementation of the waterfront concept. Where, in our opinion, administrative deficiencies exist, we expect to make recommendations to minimize or eliminate these.

Public Involvement

During the course of the study we intend to establish a close contact with the area residents for the purpose of determining their desires and to motivate them to make a positive contribution to the preparation of the concept. We will also make recommendations regarding the most appropriate means of maintaining this contact and motivation during the various stages of implementation. This is expected to result in optimizing public support and encouragement to proceed with the program.

**Detailed Sector Plans
and Staging**

We anticipate that prior to the implementation of each stage of the waterfront concept a detailed plan will have to be prepared for each sector. Our study will provide the terms of reference and much of the basic data for these sector plans. It will also ensure that each sector plan will be soundly related to all other parts of the waterfront.

Where appropriate, the concept will be a basis upon which each municipality can prepare any necessary amendments to its official plan. It will similarly serve to confirm or revise the plans and programs of other municipal, provincial or regional agencies. Questions to be given special attention during the study will be the respective roles of private investment and government funds in development programs; and the anticipated problems of land assembly in the respective concept plans. In this manner the concept will play a major role in guiding and encouraging all waterfront related public and private development.

Proposal for
THE HALTON-WENTWORTH
WATERFRONT STUDY

Acres Consulting Services Limited
Project Planning Associates Limited

SECTION C

"APPENDICES"

SECTION C

APPENDICES

INTRODUCTION

The conceptual study of the Halton-Wentworth Lake Ontario waterfront as defined in the Terms of Reference will be a study of great significance and considerable complexity. It will demand a wide range of disciplines and will require professional input of the highest calibre. The concepts for the development and the preservation of the study areas which will become the product of this consultation will have far reaching effect on the communities within the immediate study area, and indeed on all those people who live within this central portion of the St. Lawrence River Watershed.

It is for these reasons that Acres Consulting Services Limited and Project Planning Associates Limited have joined in consortium to provide the diverse manpower resources with broad and varied experience which are demanded by a study of this magnitude and importance.

The appendices include:

A brief description of the two companies and their affiliates.

The curricula vitae of those people named in the appraisal as senior members of the team, along with the vitae of other supporting professional staff.

The curricula vitae of specialist consultants who we plan to have assist in the project.

A list of some of our consulting commissions which in total demonstrate our combined experience and competence in the varied fields demanded by this study.

Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

THE COMPANIES AND

THEIR ASSOCIATES

THE COMPANIES AND THEIR ASSOCIATES

Acres is a group of companies that provides consulting engineering, architectural, economic and planning services in widely diversified fields of activities. It is a Canadian-based international organization, substantially owned and managed by its senior personnel, all of whom are actively associated with the group's day-to-day operations.

Since the founding of its first unit in 1924, Acres has grown to be one of the principal organizations of its kind in North America and has established a substantial reputation overseas.

Acres Consulting Services Limited is the management company of the group. The other companies are:

- H. G. Acres Limited
- Hedlin, Menzies & Associates Ltd.
- Acres InterTel Limited
- Acres Western Limited
- Acres Quebec Limited
- Acres Atlantic Limited
- Acres American Incorporated
- Acres International Limited

The services provided by Acres are comprehensive and extend from preliminary investigations and analyses through planning, design, preparation of drawings and specifications, evaluation of tenders, contract negotiation and management, shop inspection, field engineering, construction supervision, project management, and initial operation.

The total staff of the group numbers over 1,200 and includes professional engineers experienced in the following fields:

- Civil
- Electrical
- Electronic
- Geotechnical
- Hydraulic
- Mechanical
- Metallurgical
- Mining
- Structural
- Telecommunications
- Thermal
- Transportation

The staff also includes:

- Architects
- Engineering geologists
- Geographers
- Meteorologists
- Regional and urban planners
- Resource conservation and development specialists
- Economists
- Econometricians
- Financial specialists
- Systems analysts
- Statisticians

The economists include specialists in the fields of:

- Agriculture
- Agri-business
- Communications
- Economy forecasting
- Energy resources
- Fisheries
- Forestry
- Industry
- Mineral resources
- Recreation
- Transportation
- Water resources

Acres operates laboratories equipped and staffed for the construction of planning and design models, for the construction and testing of aerodynamic and hydraulic models, and for the performances of all geotechnical tests required for the design of engineering structures.

The group's facilities include a General Electric Model 415 computer and TWX connections between all of its principal offices.

Project Planning Associates Limited is a private, wholly Canadian owned consulting firm with its registered office at 40 Irwin Avenue, Toronto 5, Ontario, Canada. It was incorporated and granted its charter in 1956 and offers a full range of consulting services (feasibility studies, master planning, cost comparison, design, working drawings and specifications, implementation organization and supervision) in all aspects of development. The firm operates through a series of departments with the principals exercising active control. The departments are:

Town and Regional Planning

- Municipal Planning, Zoning, Economics
- Urban Renewal & Redevelopment
- Townsite Development
- Educational Planning
- Regional & Resource Development Planning

Landscape Architecture

- Public Parks & Recreation Spaces
- Regional Open Space Use Studies
- Building Site Planning
- Design of Public & Private Projects
- Conservation & Maintenance Programme

Physical Planning

- Site Selection & Analysis
- Master Planning & Urban Design
- Site Plan Design
- Subdivision Design

Engineering

- Municipal Engineering
- Highways & Traffic Engineering
- Structural Engineering
- Project Management

Hancock, Little, Calvert Associates is a wholly Canadian architectural partnership, formed in 1958 as an affiliate of Project Planning Associates Limited, to provide complementary architectural services. The partners of Hancock, Little, Calvert Associates are also Directors of Project Planning Associates Limited.

Services offered

- Building Programme, Building Economics
- Site Selection Studies, Cost Control
- Building design & implementation
- Furniture & equipment design & coordination
- Colour & graphics

Project Planning Associates is a British consultant partnership, an affiliate of Project Planning Associates Limited, with its registered office at 15 Evelyn Mansions, Carlisle Place, London S.W.1, England. Formed in 1963, it provides all the consulting services offered by Project Planning Associates Limited and Hancock, Little, Calvert Associates. Again, the partners of Project Planning Associates are also the directors of Project Planning Associates Limited, Toronto.

Project Planning Associates (International) Limited is a private, wholly Canadian owned consultant firm, an affiliate of Project Planning Associates Limited, with its registered office at 40 Irwin Avenue, Toronto 5, Ontario, Canada. To facilitate management and communications with respect to international operations, Project Planning Associates (International) Limited is the organization under which all international projects are undertaken on behalf of Project Planning Associates Limited, Hancock, Little, Calvert Associates and Project Planning Associates.

The operation of these companies is based on the concept of providing inter-disciplinary teamwork within a single organization. The goal of this operation is the best development of our environment, whether in the large scale of regional development, the intermediate range of specific site developments or in buildings. Our philosophy has drawn creative, thinking designers to the firm. As a result, the staff of these companies has a highly diverse ethnical composition with an international background, related interests and a knowledge of many languages.

The effectiveness of this teamwork has been demonstrated in the wide range of projects the firm has undertaken, a current example being our Multilateral School project in Guyana, South America. The diverse backgrounds of our staff and our goal of inter-professional teamwork has helped us greatly, in international projects. We are able easily to coordinate our own experience of design & management with the skills and knowledge of the local professionals with whom we associate abroad.

Hancock, Little, Calvert Associates Incorporated is a wholly owned affiliate of Project Planning Associates Limited, incorporated under the laws of the State of New York and its registered offices are at Suite 1407, 400 Madison Avenue, N.Y. 10017. It currently has a nucleus of U.S. resident staff and can draw upon the resources of the Project Planning Group. It offers a parallel range of services in the field of regional, urban and town planning, including tourism development, urban design, utilities, road and marine engineering, landscape architecture and architecture. The directors of Hancock, Little, Calvert Associates Incorporated are also directors of Project Planning Associates Limited.

Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

OUR STAFF

Charles H. Atkinson

Education University of Durham, Newcastle, England
B.Sc. (Honours) Civil Engineering, 1953

Professional Association of Professional Engineers,
Ontario—Member

Associations American Society of Civil Engineers—Member

Experience

1963 to date

1968 Head, Hydraulic Department, H.G. Acres Limited

Responsible for department administration and for the hydraulic aspects of all projects.

1963 Senior Engineer, Hydraulic Department, H.G. Acres Limited

Responsible for hydrologic studies for detailed design, evaluation of the power potential of the entire Churchill River basin, mathematical simulation of flood hydrographs and statistical synthesis of streamflow data, Churchill Falls Power Project, Labrador, Newfoundland.

Co-ordination of the engineering, hydrologic studies and various hydraulic designs for a review of possible schemes for reducing flooding and augmenting dry season flow of the South Nation River, Ontario.

Hydrologist for comprehensive power, flood control and irrigation studies of the Choshui and Wu River basins in central Taiwan.

Direction of the engineering services provided for the Northumberland Strait Crossing Project, New Brunswick-Prince Edward Island.

Report of the effects on Bersimis No. 1 Hydro-Electric Development of raising the level of Lac Casse.

Report on the forecasting of flows in the Saskatchewan River at The Pas, Manitoba, Grand Rapids Hydro-electric Development.

1956-1963

Head, Hydrological Department, Aluminum Company of Canada Limited.

Responsible for studies on the efficiency and development of the company's electric power system in Quebec, which has a total installed capacity of 3,500,000 hp (Chute-des-Passes 1,000,000 hp and Shipshaw 1,200,000 hp), including: direction of a cloud seeding program; studies of efficiency of water use in log-driving operations; determination of power tunnel losses at Chute-des-Passes; testing of hydraulic efficiency of turbines by Gibson and Index methods.

1955-1956

Engineer, Department of Highways, Government of Ontario.

Establishment of layouts and quantities for final cost estimating prior to construction, North Bay Region.

1954-1955

Assistant Engineer, Waterhouse and Rounthwaite, Consulting Engineers, Newcastle upon Tyne, England.

1953-1954

Junior Engineer, A.M. Carmichael Limited, Contractors, Edinburgh, Scotland.

Technical Publications

"Diversion in the Great Lakes"

University of Toronto, Division of University Extension, Great Lakes Institute, 1969 (Co-author).

"Flood Analysis and Design of Flood Control Facilities for the Churchill Falls Power Project"

Engineering Institute of Canada, Annual Meeting, Ottawa, September 1970. Published in the Engineering Journal, October 1970 (Co-author).

"Surge Tank Analysis by Computer"

Published in Water Power, February 1971 (Co-author).

"The Determination of Ice Forces on Small Structures"

Presented to the Eastern Snow Conference, February 1971 (Co-author).

"Measurement of Ice Forces against a Lightpier"

Presented at conference on Port and Ocean Engineering under Arctic conditions, Technical University of Norway, August 1971.

Education University of Alberta, Edmonton, Alberta, B.Sc., Civil Engineering, 1960
University of Illinois, Urbana, Illinois, M.S., Soil Mechanics and Foundation Engineering, 1966, Formal studies in rock mechanics completed for presentation of Ph.D. thesis in 1970

Memberships Member, The Association of Professional Engineers of the Province of British Columbia
Member, International Society for Soil Mechanics and Foundation Engineering
Member and Canadian representative on "Committee on Standardization of Laboratory and Field Tests" and member of "Subcommittee on Proposed Methods for Determination of Swelling, Slaking and Durability of Shales", International Society for Rock Mechanics

Experience

1969 to date

Staff Consultant, Rock Mechanics, The Acres Group. Responsible for co-ordinating and directing the preparation of a report dealing with the effects of seismicity on the siting of nuclear power stations in the New England area.

Responsible as Site Geotechnical Engineer for the geotechnical aspects of all engineering studies and designs for the Aslantas Project (hydroelectric power, 170 Mw), Turkey. The project will include a 300-foot high earth and rockfill dam founded on a clay-shale foundation. Large zones within the dam structure including the impervious core, will be constructed from compacted clay-shale. The major geotechnical design problems of the project include the stability of excavated slopes, tunnelling, tunnel support, the stability of the dam and associated structures.

Responsible for the technical review of the rock mechanics problems and geotechnical design adequacy for various projects, including:

- Stability studies of rock slopes and concrete structures on rock, and establishment of penstock design criteria, Sirikit Power Development (320,000 kw hydroelectric), Thailand;
- Stability studies of concrete gravity dam, and design of foundation treatment and geotechnical instrumentation, Nam Ngum Project (30,000 kw hydroelectric), Laos;
- Establishment of design criteria for the penstocks, Alto Anchicaya Project (340,000 kw hydroelectric), Colombia;
- Establishment of design criteria and review of design adequacy as construction progresses for penstocks, rock pressure relief and drainage systems, rock grouting, and temporary and permanent treatment of unlined cavities in rock, Churchill Falls Project (5,225,000 kw hydroelectric), Labrador, Newfoundland.

Rock Mechanics Engineer, H.G. Acres & Company Limited. Responsible for the planning, co-ordination and interpretation of studies to establish the geotechnical design criteria for the underground rock chambers and rock foundations of surface structures for the Churchill Falls Power Project. The work included:

- The definition and interpretation of complex computerized studies to predict the behaviour of rock masses for the establishment of acceptable geometry and artificial reinforcement of cavities in rock;
- The definition of laboratory programs and interpretation of the results of tests on rock specimens;
- The detailed design of rock bolting, grouting and pressure relief systems, and of the geotechnical aspects of steel and concrete-lined penstocks;
- The preparation of specifications for rock blasting, excavation, grouting, pressure relief, reinforcement and instrumentation.

Responsible for the planning, execution and interpretation of large-scale tests on in situ rock and for the correlation and use in design of the test results.

Design of comprehensive instrumentation systems to monitor the stability of underground rock chambers and surface structures on rock, when subjected to static and dynamic loadings.

1966-1967

Research Assistant, Department of Civil Engineering, University of Illinois.

1962-1965

Assistant Soils Engineer, International Power and Engineering Consultants, Vancouver, British Columbia. Responsible for inspection and control of a large-scale drilling program for the investigation of soils and rock at the site of the Portage Mountain Dam, British Columbia.

1960-1962

Junior Soils Engineer, Prairie Farm Rehabilitation Agency, Saskatoon, Saskatchewan. Responsible for field investigations, laboratory studies, and preparation of reports and preliminary designs for the construction of earthfill dams.

Technical Papers

"In Situ and Induced Stresses at the Churchill Falls Underground Powerhouse, Labrador." For presentation at ISRM Second Congress, Belgrade, Yugoslavia, September 1970 (with T.W. Kierans and O.T. Sigvaldason).

"Plate Jack Tests at Churchill Falls Underground Powerhouse, Labrador." ASTM, Winter Meeting, Committee D18, Denver, Colorado, February 1969 (with D.K. Murphy and D.R. McCreath).

"Stress Analyses of Underground Openings in Rock Using the Finite Element Method." Engineering Institute of Canada, Annual Conference, Halifax, Nova Scotia, May 1968 (with O.T. Sigvaldason and M.V. Thompson).

Werner Otto Billing

Born	1922, Karlsruhe, Germany
Education	Technical University of Karlsruhe, Civil Engineering Course 1945-51. Diploma in Civil Engineering in 1951. Post-graduate studies in Traffic Engineering at Northwestern University, Evanston, Illinois, U.S.A.
Memberships	Association of Professional Engineers of Ontario. Engineering Institute of Canada. Institute of Traffic Engineers, U.S.A. and Canada.

Mr. Billing has been active in municipal and transportation engineering since 1952. Through his work, he has gained extensive experience in planning and detailed engineering design of municipal services and transportation aspects on a city, regional and national scale. His work has primarily taken place in Canada, Pakistan, Kuwait, Germany, Africa, Monaco, the United States and the United Kingdom. He has been Project Director and Co-ordinator on many of the large-scale projects undertaken by this Company.

Mr. Billing has lectured at Harvard University, U.S.A., and has tutored architectural students at the University of Toronto in traffic and transportation engineering.

Mr. Billing's experience includes analysis and design of roads, highways, interchanges and parking facilities, functional design of street and freeway networks, traffic operations and the development of comprehensive transportation systems for regions, cities and towns in close relation to land use planning. This experience has included initiation, implementation, and evaluation of traffic and transportation surveys.

His experience also includes design of water supply and distribution systems, storm drainage, sanitary sewerage systems, street lighting and the planning and design of municipal engineering trunk systems for cities, regions and new developments.

Mr. Billing is a director of Project Planning Associates and in recent years has held the position of Office Manager, directly responsible for the administration and direction of all operations functions of the Toronto office, including the mobilization and co-ordination of all staff for domestic projects along with the technical and operational back-up staff, numbering approximately 80 people. In this position he is directly responsible for all budgeting, costing, scheduling and allocation of manpower resources and reports directly to the Vice-President of Operations.

Because of Mr. Billing's experience in regional and city traffic planning, and with his administration background, he has been part of and/or been Project Director and Administrator of interdisciplinary teams for various projects undertaken by the Company. In this position his duties have required him to maintain and liaise with clients, committees, various governing bodies and sub-consultant staff.

Mr. Billing has had the responsibility of staff training within the Company in the municipal engineering and traffic and transportation engineering fields.

Experience

1958 to date Project planning Associates Limited, Toronto, Canada.

Director of Project Planning Associates, Toronto Office Manager and principal traffic and transportation engineer. In this capacity, Mr. Billing has applied his professional experience on the various projects with respect to his engineering background, as well as being directly responsible for CPM-PERT and bar chart programming and allocation of manpower resources.

For the past few years he has been:

Principal in charge of the proposed new Malvern Community project undertaken for the Ontario Housing Corporation and Central Mortgage and Housing Corporation in the Toronto area.

Special consultant in traffic and transportation studies and member of the design team for the new Meadowvale community of 100,000 persons. He was responsible for all transportation and traffic design elements including the method of attachment to the Provincial freeway network with respect to this new town, west of Toronto, Canada.

Principal in charge and transportation planner for the studies undertaken for the Toronto Exhibition Park. This project, located in Metropolitan Toronto between two major expressway systems required re-evaluation and redesign in relation to the expansion program.

Principal in charge of a team of planners, landscape architects, architects, transportation and traffic engineers, structural engineers, coastal and maritime engineers, municipal engineers and other specialist consultants for the Kuwait Waterfront Project, Kuwait. Mr. Billing on this project, undertook the design of the detailed traffic survey undertaken by the staff of Project Planning Associates in conjunction with counterpart staff from the Ministry of Public Works, Kuwait. He was directly responsible to the management of Project Planning Associates and the Ministry of Public Works for all activities under the contractual agreement. This initially involved the programming and co-ordination of a base data study, including

aerial photography and mapping, hydrographic investigation, land and soil surveys and hydraulic investigations of the entire waterfront of Kuwait. This was further followed by co-ordination of all Master Plan design and documentation and detailed design and documentation for the project which is valued at \$50 million U.S.

Traffic engineer responsible for traffic and transportation input on the interdisciplinary team studying the Monaco Waterfront Development, Monaco. This is an urban and tourist facilities expansion of the Principality of Monaco on reclaimed land and structures in deep water. Traffic evaluation and design included the complete internal transportation systems for this new waterborne community of some 20,000, as well as the road connections to the existing Corniche system and a new auto route extending from Paris through to Italy.

Traffic engineer on interdisciplinary team responsible for the planning and design of all road and parking systems for the new Guelph University, Guelph, Ontario.

Member of the site selection team, evaluating sites for the 1967 International Exposition Montreal, Canada.

Principal in charge and traffic engineer, for Dar es Salaam National Capital Master Plan project. Mr. Billing was a member of the initial reconnaissance survey team and then directed the operation of other traffic engineers who were either resident in Dar es Salaam during the study or present in the Toronto office.

Specialist consultant to the team with respect to traffic engineering matters for the Master Plan for Aberdeen, Scotland.

Member of planning team responsible for all traffic and municipal engineering for the Century City project undertaken for the Aluminum Company of America in Los Angeles, California, U.S.A. This plan was a design for a high density city within the urban area of Los Angeles on the land held by 20th Century Fox Studios.

Project engineer responsible for the design and preparation of working drawings and contract documents, field layout and general supervision for watermains, sanitary sewers, house service connections and approximately seven miles of residential streets including sidewalks for Bridlewood Sub-Division, Metropolitan Toronto, Canada.

Design Engineer for the functional design of two major interchanges on the Trans-Canada Highway near Lake Louise in Banff National Park, Alberta, Canada.

Design engineer for water supply systems, hydraulic fill operations and drainage schemes for Toronto Island Parks System, Metropolitan Toronto, Canada. This park is a major Metropolitan recreation area with an ultimate maximum attendance of 100,000 people.

Traffic and Transportation and Municipal Engineer for the Multan Road Town Site project, Lahore, Pakistan.

1953-1958 Don Mills Developments Limited, Toronto, Canada.

Design engineer for municipal and traffic engineering for the Don Mills New Town Development, working directly for Mr. M.L. Hancock, the Planning Director of Don Mills Developments Limited, now President of Project Planning Associates.

1952-1953 Central Mortgage and Housing Corporation, Ottawa, Canada.

Junior engineer assisting in field layout of municipal services, roads and parking lots in residential housing developments.

Canadian citizen; married with two children.

Speaks English and German.

Thomas J. Bradshaw

Education University of Toronto, Toronto, Ontario, B.A.Sc., Civil Engineering, 1957

Memberships Member, Association of Professional Engineers, Ontario
Member, International Society of Soil Mechanics and Foundation Engineering

Experience

1962 to date

Acres. 1962 Senior Soil Mechanics and Foundation Engineer. Project engineer on a multidiscipline study of the Scarborough section of the Metropolitan Toronto waterfront, including analysis and recommended solutions for a bluff erosion problem, and plans for recreational development of the area.

Co-ordination of geotechnical office studies for a review of the development of the hydro-electric power potential of rivers flowing into James Bay from Quebec, Hydro-Quebec.

Supervision of preliminary field investigations on three potential sites for a marine and industrial development in Puerto Rico and preparation of a report leading to final site selection.

Responsible for geotechnical investigations and geotechnical aspects of design and construction supervision for foundations for structures of a silicon carbide furnace plant, located in an area of Karst topography and weathered in place soils containing numerous cavities, The Carborundum Company, Jacksboro, Tennessee.

Direction of geotechnical investigations, geotechnical aspects of design, and supervision of site preparation, including stabilization of a 200-foot high rock slope, previously the working face of a quarry, for foundations of a 40-foot high, 116-foot diameter caustic soda storage tank, Baie Comeau, Quebec.

Project Engineer for foundation explorations, definition of foundation design criteria, and design of geotechnical works and processes, including embankment fills, dams, cofferdams, excavations, dewatering, foundation stabilization, foundation elements (spread footings, rafts, piles and caissons) for buildings, bridges, tunnels, deep pumping stations, pipelines, large industrial chimneys, dams, pollution-control lagoons, and fuel storage tanks.

Co-ordination of geotechnical investigations, studies and designs for excavations, tunnels, foundations, dams and embankments for Northumberland Strait Crossing Projects, a highway tunnel under the Welland Canal, and a new filling system for Lock 6, Welland Canal, Thorold, Ontario.

Study designs of dams for an investigation of irrigation and power potentials of the Choshui and Wu River basins, Taiwan.

Assessment of existing geotechnical data, development of a comprehensive field investigation program, and preliminary design studies for the powerhouse dikes, proposed Churchill Falls Power Project, Labrador, Newfoundland.

Resident Engineer for construction of a mineshaft caisson and headframe substructure, Thompson, Manitoba.

1961-1962

Postgraduate Student, University of Alberta, Edmonton, Alberta. Research on shear strength characteristics of expansive clays; and studies in soil mechanics, soils laboratory methods, river engineering and geology.

1959-1961

Soils Engineer, Underwood-McLellan and Associates Limited, Consulting Engineers, Saskatoon, Saskatchewan. Administration and technical direction of the soils mechanics department and laboratory; and supervision of foundation investigations for structures, buildings, and pipelines.

1957-1959

Assistant Divisional Engineer, Woodlands Division, Marathon Corporation of Canada Limited, Caramet, Ontario. Designs for a small concrete gravity dam with a log sluiceway and owner's agent for construction of the structure; design and supervision of construction of small buildings.

Education Master of Arts (Geography), University of Cambridge,
Diploma in Town Planning, Edinburgh College of Art.

Research Assistant, City of Edinburg, Scotland. On Development Plan team involved in 5 year review of City Development Plan.

Memberships Member, Royal Town Planning Institute
Member, Town Planning Institute of Canada and the Atlantic Planners Institute
Member, Community Planning Association of Canada.

Experience

1969 (part) to date

Mr. Bramley was formerly Senior Planner in the Halifax office of Project Planning Associates Limited where his duties included directing the preparation of the Official Community Plan, City of Bathurst, N.B., and the Windsor/West Hants Joint Planning Study. Other assignments included establishing planning parameters and market demand for the Cape Breton Federal-Provincial Land Assembly, and for Centennial Place, Moncton, N.B., and the preparation of economic and planning studies for several other residential, commercial and industrial development in the Halifax-Dartmouth area.

During this time he acted as Interim Director, Cape Breton District Planning Commission for a period of eighteen months with responsibility for directing the work of commission staff in establishing regional planning policies, preparation of municipal plans and supporting legislation and in providing planning advice to participating municipalities for a region of 130,000 persons.

During 1971-72 Mr. Bramley was the planner on the project team for the detailed sector plan of the Pickering-Ajax Sector of the Metro Waterfront for the Metropolitan Toronto and Region Conservation Authority.

1966-1969

Assistant Area Planning Officer, Durham County Council, England, responsible for control of development in six urban and rural districts containing approximately 200,000 persons, including 6 months deputising for area officer. Duties included evaluation of planning applications and making recommendations to District Councils, also meetings with public and private developers, district officials, and councillors and representing the Local Planning Authority at local Public Inquiries into planning decisions appealed to the Minister of Housing and Local Government.

1965-1966

Planner working for the City of Glasgow, Scotland. Member of urban renewal team, responsible to team leader. Participated in survey, data analysis and scheme preparation and implementation. Co-ordinated activities of other City departments and other development agencies in relation to compulsory purchase, relocation, demolition, service diversions and closures, new construction.

Robert G. Calvert

1953-1954

Mr. Calvert was Project Architect with the firm of Fleury and Arthur, Architects. He was responsible from design to completion for the Students' Union of Victoria College, University of Toronto.

1949-1951

Mr. Calvert was Project Architect with the firm of Sharpe Thompson Berwick and Pratt, Vancouver. With them, he carried out a number of high school assignments, and was also Chief Specification Writer.

Experience

1958 to date

Mr. Calvert joined Project Planning Associates Limited as Architect to set up the architectural practice within the comprehensive consulting framework established for the company. For the first few years he was actively engaged in expansion and consolidation of the architectural practice. Mr. Calvert at this time directed the design and implementation of all the buildings built for the Ontario-St. Lawrence Seaway Parks, created during the damming of the St. Lawrence River hydro-electric and ship channel project.

In late 1963, in response to a request from the Corporation of the Canadian World Exposition (Expo'67), the company seconded Mr. Calvert to the Corporation management, to carry out duties of coordinating buildings and landscape. This work required his services until the end of 1967.

Released from Expo'67, Mr. Calvert established an office for the company in Montreal, from which he directed design and execution of the dramatic restoration of historic Fort Louisburg in Nova Scotia for the Federal Government. This project required considerable research in Canadian and French archives.

Since 1969, Mr. Calvert has, as Project Manager, been responsible in Georgetown, Guyana, for the smooth operation of the Multilateral Secondary School project for the IBRD IDA/Government of Guyana. His tour of duty in Guyana is expected to terminate in the near future.

1957-1958

Mr. Calvert was responsible for the operation of Building Information Centre in Toronto, sponsored by a consortium of major industries in the building construction field.

1954-1957

Mr. Calvert had established his own practice, with architect Stanley Butcherd, in Toronto. During these years he was engaged on a number of residential and school building projects, and also designed and executed the Television Station for Barrie, Ontario.

John D. Consolati

Born	1940, Massachusetts, U.S.A.
Education	University of Notre Dame, Department of Architecture, 1958-1960 Rhode Island School of Design, BSLA, 1960-1964
Memberships	Member, The American Society of Landscape Architects Member, Ontario Association of Landscape Architects

Experience

1968 to date

Mr. Consolati joined Project Planning Associates Limited as Project Landscape Architect, where he has undertaken the full range of landscape architectural activities.

In master planning, Mr. Consolati has worked on the Fort Edmonton project, which has required the establishment of a comprehensive development plan combining historical conservation and restoration of landscape and buildings, with a large-scale City park facility. Also in master planning, he has been involved in preparation of definitive concepts for overall landscaping of the Université de Laval campus in Quebec.

Mr. Consolati has also been involved in public open-space planning including detailed landscape design of constituents, for the new Town of Meadowvale west of Toronto.

In the educational field, Mr. Consolati has been responsible for full landscape architectural services, design and contract documents for Cambrian College of Applied Arts and Technology, Sault Ste. Marie campus, and for two student residence complexes at the University of Guelph, Ontario.

1966-1968

Mr. Consolati was project Landscape Architect for Richard Strong Associates in Toronto, where he worked as part of the team engaged on the Niagara Scenic Drive project. While with this company, he was responsible for full services from design to supervision for a number of projects at both York and Brock Universities in Toronto and St. Catharines, Ontario.

1964-1966

During his period of National Service in the United States Armed Forces, Mr. Consolati was concerned, as part of a team, in the establishment of a Landscape Department for the 5th Army. This department is responsible for the development of long-range landscape control plans for its military establishments.

Education University of Alberta, Edmonton, Alberta,
B.Sc., Civil Engineering, 1960
Queen's University, Kingston, Ontario, M.Sc.,
Civil Engineering (Hydraulics), 1962

Memberships Member, Association of Professional Engineers
of the Province of Ontario
Associate Member, American Society of Civil
Engineers

Experience

1962 to date

Senior Engineer, Hydraulic, The Acres Group. Responsible for the supervision of the design, construction, calibration and testing of a hydraulic model of the Nan River, Thailand. The work was undertaken to determine the effect of peaking operation of the Sirikit Power Development on a downstream navigation and irrigation operations. The model was constructed at Bangkok, Thailand, and it was 500 metres long to simulate a prototype section of the river 300 km. in length.

Responsible for the supervision of the design, construction and testing of a hydraulic model to determine the operating characteristics of a proposed inverted syphon having a rating of 9,000 cubic feet per second

Studies and definition of the hydraulic design criteria for a study of the technical and economic feasibility of developing tidal power sites in the Chignecto Bay region of the Bay of Fundy.

Studies of reservoir sedimentation.

Responsible for the supervision of the field measurements, and the design, construction and testing of three large hydraulic models to investigate the possible effects of tide, wave and ice action on such various types of structures that might be built for the Northumberland Strait Crossing.

Development of a computer program for the simulation of the tidal regime of Northumberland Strait.

Studies of the effects of ice and of tailwater fluctuations, and hydraulic designs for the Mactaquac Development (840,000 hp), New Brunswick.

Calculation of river rating curves, and canal and spillway capacities for the design of the hydraulic structures of the Los Esclavos Development (19,000 hp), Guatemala.

Hydraulic designs for proposed improvements of the flood control channels of Mimico Creek, Toronto, Ontario

Postgraduate Student and Research Assistant, Queen's University, Kingston, Ontario. Participation in investigations using hydraulic models of wave action, the effectiveness of log booms for pulpwood, and the characteristics of bounded jet flow.

Technical Papers

"Tidal Model of the Northumberland Strait", ASCE National Meeting on Environmental Engineering, Chattanooga, Tennessee, May 1968, Preprint No. 691.

"Ice Model Studies for the Northumberland Strait Crossing" Eastern Snow Conference, Annual Meeting, Boston, Massachusetts, February 1968.

"The Use of Wave Energy to Reduce Silt Deposition in a Harbour" EIC Transactions, Volume 5, 1961 (Co-author).

Maarten W. Dake

Born	1929, The Netherlands
Education	Bachelor of Science in City Planning, Degree from the University of Illinois in the United States, 1959 Diploma of Comprehensive Planning from the Institute of Social Studies in The Hague, The Netherlands, 1964
Memberships	Member, Town Planning Institute of Canada Member, American Institute of Planners.

Mr. Dake is the Executive Assistant to the President. Prior to this appointment he was Chief Planner of Project Planning Associates for five years and directly responsible for a planning staff of approximately fifteen people. Mr. Dake's experience in planning commenced in 1953 (seventeen years) and has included all detailed aspects of city and regional planning with considerable emphasis on planning, law and administration. Mr. Dake has taken a leadership role with respect to the new community design programs of the firm.

Experience

1959 to date

Mr. Dake has participated in the following regional planning projects:

The Northern New Brunswick and the Western Newfoundland Regional Plans for the Governments of Canada, New Brunswick and Newfoundland. This required the preparation of long-range comprehensive development plans for a 2,000 square mile region, containing 13 towns and a population of 100,000 in New Brunswick and a 4,000 square mile region containing one city and 10 towns and a population of 150,000 in Newfoundland; socio-economic analyses and projections; determination of comprehensive infra-structure requirements; agricultural and industrial development programs; community improvement and expansion plans; cost estimates; and administrative implementation programs.

A Master Plan for the Halifax-Dartmouth Urban Region in Nova Scotia: a 200 square mile region surrounding the Cities of Halifax and Dartmouth, which will accommodate a future population of 500,000; demographic and economic studies; determination of future requirements for housing, community facilities, shopping and industries; analysis and design of the water supply, sewage disposal and transportation systems; design of the urban and rural community structure; design of the administrative means of implementation; and extensive programs of public information.

He has been a team member on urban planning projects including municipal master plans for some 45 municipalities throughout Canada, including cities, towns, villages and rural townships: physical, demographic and economic analyses and projections; land use, utilities and transportation plans; housing and subdivision analyses, plans and programs; capital works and administrative implementation programs and cost estimates; and public information and ongoing detailed implementation plans and programs.

Urban Renewal Studies and Schemes for some 10 Canadian cities and towns: housing and infra-structure evaluations; building replacement and improvement plans; economic analyses for participation by private enterprise; detailed cost and financing programs; and community participation programs.

He was senior planner for Urban Renewal Study for St. John's, Newfoundland—a comprehensive rehabilitation and redevelopment plan for the provincial capital with a population of 100,000: design and execution of comprehensive data collection and analysis; overall renewal plan design; detailed programs and procedures for implementation of the first phase including financing and administration.

Renewal program covering 20 urban centres in Manitoba: a comprehensive evaluation of the renewal requirements of 20 small towns within their regional economic context; detailed recommendations regarding a long range integrated renewal program.

Institutional Planning includes the Metropolitan Toronto Separate School Study—a long range plan to guide the expansion and improvement of the entire Roman Catholic School System in Metropolitan Toronto which currently accommodates some 100,000 students: demographic analyses to estimate future public generation and distribution; evaluation of existing school buildings and sites; determination of future land and building requirements and their distribution in the metropolitan area; analyses of optimum relationships between schools and the overall urban structure; and recommendations regarding new school construction and financing.

The United Church Study for Metropolitan Toronto—a study to determine the future role of the Protestant United Church in an urban society: analyses of church member attitudes and requirements; analysis of the relationships between current church philosophies and policies and the objectives of the overall urban population and development of a model of future re-evaluation of church objectives and policies.

New Town Planning includes Meadowvale New Town, Metropolitan Toronto and New Providence New Town, Bahamas.

1956-1959

Attendance at the University of Illinois.

1953-1956

Planner for Don Mills Developments Limited: participation in the master plan design, and detailed implementation of a new town for a population of 35,000 people in Metropolitan Toronto.

1952-1953

Construction Land Surveyor on the Hydro-Electric project in Seven Islands, Northern Canada.

Dutch citizen.

Speaks English, Dutch.

Paul J. Denison

Education University of Toronto, Toronto, Ontario B.A. (Honours) Mathematics and Physics, 1944
M.A. Meteorology, 1946

Professional Canadian Association of Physicists — Member Canadian

Associations Meteorological Society — Member Royal Meteorological Society — Member Royal Meteorological Society — Fellow American Meteorological Society — Professional Member American Geophysical Union — Member Air Pollution Control Association — Member American Association for the Advancement of Science — Member

Experience

1965 to date

Research Executive, H. G. Acres Limited

Water quality management methodology and its application to the Saint John River.

Study of transport and diffusion of heated effluent discharges into the Great Lakes Basin, and the long-term effects of artificial thermal inputs, Government of Canada.

Study of nature and characteristics of natural ice, economic aspects of ice effects, methods and economics of ice control, and preparation of a program for ice research offering the greatest potential benefits, Government of Canada.

Study of existing electric power generation and distribution, and optimization of future system design with respect to environmental quality control, New England Regional Commission.

Preparation of a schedule of priorities for a proposed 10-year national program of water resources research, Government of Canada.

Evaluation of methods of streamflow analysis and selection of those most suitable for planning of water conservation projects, Joint Task Force on Water Conservation Projects in Southern Ontario.

Studies of winds and atmospheric stability, for evaluation of air pollution by stack gases of thermal power plants proposed for construction in Ontario and in Guatemala, and by emission from an aluminum smelter in the U.K.

Air quality surveys and atmospheric diffusion studies in Ontario metropolitan areas, including an analysis of the frequency and duration of hazardous air pollution conditions.

Development of a digital computer program for analysis of frequency of dyas suitable for construction work at Lower Notch Power Project, Ontario.

Study of wind, wave and ice conditions for the Northumberland Strait Crossing Project, N Brunswick-Prince Edward Island.

Design flood analysis, reservoir wave studies, and estimates of wind and ice loading on transmission lines for hydro-electric power projects.

1954-1965

President, Weather Engineering Corporation of Canada Ltd., Montreal, Quebec.

Management and technical direction for consulting services in meteorology, climatology, hydrology and oceanography for commercial, governmental and industrial clients, including:

hydrometeorological studies of watersheds in Eastern Canada; design, supervision and evaluation of cloud seeding programs; air pollution surveys and analyses; investigations of atmospheric diffusion processes using radar tracking; studies of precipitation and related streamflow; studies of thunderstorm and lightning stroke frequencies; studies of wave and ice conditions; meteorological evaluations for land survey and development siting.

1963-1965

Lecturer, Department of Geotechnical Sciences, Loyola College, Montreal, Quebec

1944-1954

Meteorologist, Department of Transport, Montreal, Canada

Preparation of master weather map analyses and prognostic weather charts, analyses of surface and upper-level meteorological data, and weather forecasts for public, aviation and marine users.

Technical Publications

Some Aspects of Arctic Climate Affecting Air Pollution Control Paper presented to Air Pollution Control Association, Pacific Northwest International Section, Calgary, November 1971.

Thermal Inputs to the Great Lakes 13th Annual Conference on Great Lakes Research, Buffalo, N.Y., 1970 (Co-author).

Diversions in the Great Lakes University of Toronto, Division of University Extension, Great Lakes Institute, 1969.

Economic Factors in Industrial Planning for Air Pollution Control Engineering Institute of Canada, Annual Meeting, Halifax, Nova Scotia, 1968 (Co-author).

Air Pollution and Urban Design Air Pollution Control Association, Ontario Section, Fall Meeting, Honey Harbour, Ontario, 1968 (Co-author).

Water Resources and Climate Control — Economic Factors Congress of Canadian Engineers, Montreal, Quebec, 1967 (Co-author).

Emil Dinkla

Experience

1969 to date

Vice-President, Acres Consulting Services Limited. Consulting direction and supervision of the studies and engineering for various projects including:

- Feasibility study for the proposed development of a new shipyard facility for the construction of Very Large Crude Carriers up to 300,000 dwt. at Kaohsiung, Taiwan
- Engineering feasibility study for the proposed expansion of a shipyard in Newfoundland for the construction of tankers up to 220,000 dwt.
- Consultant services on salvage work for the SS Union Faith, the SS Antilles, the oil barge Irving Whale and a coastal freighter
- Feasibility study for the proposed development of a complete shipyard facility for the construction of tankers up to 300,000 dwt., Ulsan, South Korea
- Appointed independent Arbitrator on three separate tribunals established to resolve disputes between Owners and Contractors
- Feasibility study of the proposed addition of a dry dock and steel fabricating facilities to an existing shipyard installation to permit the construction of tankers up to 500,000 dwt., Shipyard Split, Split, Yugoslavia
- Evaluation of the feasibility of expanding a dry dock to accommodate tankers up to 500,000 dwt., Saint John Shipbuilding and Dry Dock Company Limited, Saint John, New Brunswick
- Conceptual studies of marine oil-loading terminal modules and oil-drilling platforms for use in Arctic waters
- Construction method studies and cost estimates for the powerhouse and control structures of a tidal power development proposed for the Bay of Fundy.

1968-1969

President and Chief Executive Officer, Northumberland Consultants Limited, Montreal, Quebec. Responsible for the administration, direction and co-ordination of the engineering for the economic and construction studies, and for the designs and specifications for the proposed Northumberland Strait Crossing, New Brunswick-Prince Edward Island.

1965-1967

Vice-President, Marine Construction, The Foundation Company of Canada Limited

Vice-President, Foundation Maritime Limited

Vice-President and Director, Eastern Salvors Limited

Vice-President, Foundation Overseas Limited

Vice-President, Frontier Construction Company, Incorporated (U.S.A.)

Responsible for the administration and direction of all marine construction and salvage operations undertaken by the group in Canada and abroad.

1963-1964

Vice-President, Heavy Construction, The Foundation Company of Canada Limited

Vice-President, Foundation Maritime Limited

Vice-President, Foundation Overseas Limited

Responsible for the administration and direction of all heavy construction and marine construction projects undertaken by the group in Canada.

1955-1963

Manager, Heavy Construction, The Foundation Company of Canada Limited.

Responsible for the supervision of all field operations of the group in Canada.

1954-1955

General Superintendent, Heavy Construction Department, The Foundation Company of Canada Limited. Responsible for the management of the construction of the Beechwood Development (hydroelectric), New Brunswick.

Responsible for the supervision of the construction of various marine structures, wharves and bridges.

1945-1953

Project Manager, Heavy Construction Department, The Foundation Company of Canada Limited. Responsible for the co-ordination of 33 simultaneous contracts for a major steel mill expansion program, Algoma Steel Corporation Limited, Sault Ste. Marie, Ontario.

Responsible for the supervision of marine construction for the Pine Falls Development (hydroelectric), Manitoba.

1941-1945

General Superintendent (1943-1945) and Chief Loftsmen, and Hull and Outfitting Superintendent (1941-1943), Shipyard, Foundation Maritime Limited, Pictou, Nova Scotia.

1933-1940

Ship and bridge construction in Europe.

Principal Projects

Marine Constructions

Port Cartier Harbour

Cargill Wharf, Baie Comeau, Quebec

Wharves (three), Cornerbrook, Botwood, Grand Falls, Newfoundland

Wharf, Levis, Quebec

Wharves (five), Montreal, Quebec

Alcan Wharf, Port Alfred, Saguenay River, Quebec

Wharves (four), Halifax and Dartmouth, Nova Scotia

Wharf, Quebec City, Quebec

Wharves (three), Saint John, New Brunswick

Wharf, St. John's, Newfoundland

Wharf, Borden, Prince Edward Island

Wharf, Three Rivers, Quebec

Wharf, Strait of Canso, Nova Scotia

Wharves (two), Sydney, Nova Scotia

Wharves (two), Toronto, Ontario

Synchro-lift and dry-dock facilities, Halifax, Nova Scotia

Pier for Bridge, Foundation Borings, Strait of Canso Crossing, Nova Scotia

Breakwaters

Port Hood, Nova Scotia

Negro Point, New Brunswick

Back Bay, New Brunswick

Saint John, New Brunswick

Lighthouses

White Island Lighthouse (Construction), Gulf of St. Lawrence

Lurcher Shoal Lighthouse (Study), Gulf of St. Lawrence

Representative Marine Salvage Operations

SS Beaverhill

SS Desola

MV Cabot

MV Federal Express

MV Fort William

MV Tritonica

Oil-Drilling Programs

Studies of the types and probable capital costs of oil exploration drilling platforms for use in arctic waters, and of the current, wave and ice forces that such platforms might encounter

Advisement on oil and gas production platforms for various locations including Cook's Inlet, Alaska, East Coast, Hudson Bay and the Great Lakes

Conceptual design and review of construction methodology for oil-production platforms in the Norwegian area of the North Sea

Arctic Construction

Harbour Facilities Construction, Churchill, Manitoba

DEW Line, North West Territories

Frobisher Bay, North West Territories

West Coast, Greenland

Hydro-Electric Power Developments

Pine Falls, Manitoba

Beechwood, New Brunswick

Hart-Jaune, Quebec

Grand Falls, Newfoundland

Underpinnings

Numerous grain elevators

Various steel rolling mill units

Bridges

Nuns' Island Bridge, Montreal, Quebec Grand Falls, Newfoundland

Masson, Ontario

Mission River Bridge, British Columbia

Thetford Mines, Quebec

Various subway overpasses and underpasses, Toronto, Ontario

Hangars

Botwood, Newfoundland

Pembroke, Ontario

Churchill, Manitoba

Water Supply Works

Several pump houses and intakes

Locks

Beauharnois, Quebec

Iroquois, Ontario

River Crossings

Pipeline and cable, St. Lawrence River, Quebec to Gaspé

Peninsula, New Brunswick

Paper mill pipeline, Newcastle, New Brunswick

Large Rock Excavations

Cornerbrook, Newfoundland

Mine Shafts

Thetford, Ontario

Mattagami Lake Mines, Quebec

D.R. Flood

Born 1931, Kitchener, Ontario

Education St. Jerome's College, Kitchener
Mathematics Gold Medal
University of Toronto Extension
Sociology and Social Psychology

Memberships Member, Town Planning Institute of Canada.

Mr. Flood has been active in municipal planning since 1955 and has specialized in the legislative aspects of planning. During this period he has obtained experience as a project leader in communication and liaison, presentations and negotiations with various civic and government agencies as well as private organizations including presentations at public meetings and Ontario Municipal Board Hearings.

Experience

1961 to date

As a Senior Planner with Project Planning Associates Limited, he has assisted a wide range of municipalities in their planning programmes including such places as Acton, Bala, Bracebridge, Brighton, Brockville, Caledonia, Collingwood, Couchiching, Borough of East York, Innisfil Township, Monck Township, Moore Township, Paris, Parry Sound, Pickering Village, St. Thomas, Seneca Township and Smiths Falls.

Other planning assignments were undertaken in Sault Ste. Marie, Interlake Region in Manitoba; Lousibourg, Nova Scotia; Grand Falls-Windsor, Newfoundland; and Century City in Los Angeles, California.

Current projects include the preparation of the Official Plan and Zoning By-law for the Township of Nepean (Ottawa), Town of Trenton, and the Village of Rockcliffe Park (Ottawa).

His responsibilities include the scheduling of work and direction of supporting staff in the research analysis and preparation of comprehensive Official Plans, Zoning By-laws, Urban Renewal Studies, annexation studies, including negotiations with appropriate government agencies and officials in the submission and subsequent approval of planning documents and proposals.

1955-1961

Prior to joining Project Planning Associates Limited in 1961, Mr. Flood was employed since 1955 by the planning firm of Dryden and Smith in Kitchener. The Kitchener firm worked on planning assignments in Guelph, Preston, Galt, Chatham, Thorold, and the St. Lawrence Seaway. The firm also functioned as the Kitchener Planning Department until such time as the city established its own planning section.

Canadian citizen.

Speaks English.

Karl Frank

Born	September 16, 1935, Ludwigshafen, Rhein, Halz, Germany
Education	University of Toronto (Bachelor of Landscape Architecture) 1965-69 (First graduate of landscape architecture) Ryerson Institute of Technology, 1959 Berufsschule Neustadt a.d. Weinstr. Certificate of the BDA (Federation of German Architects) for Architectural Draftsmen Certificate of the BDA for Brick & Stone Masons—Carpentry Trade.

Experience

1969 to date

Project Planning Associates Limited, 40 Irwin Avenue, Toronto 189, Ontario.

1959-1969

Canada: Various private and professional experience in the general field of landscape architecture, as well as planning, engineering and architecture, which included parks and public grounds, industrial estates, newtown developments and subdivisions, housing and private residences.

1953-1957

Germany: Various private and professional experience in architecture, planning and site development of subdivisions, apartment buildings, row houses as well as industrial and commercial buildings.

Canadian citizen.

Speaks English and German.

Married with one child.

Alan Murray Graham

Born 1926, Cairo, Egypt

Education Christ College, Oxford, England

Architectural Association School, London, England, Diploma, Architectural Association, U.K.

Memberships Member, Architectural Association, U.K.
Member, Royal Institute of British Architects (1958)
Member, Royal Architectural Institute of Canada
Member, Canadian Society of Landscape Architects.

Mr. Graham has been active in architecture, landscape architecture and urban design since 1953. He has attained all-round experience on interdisciplinary consulting teams involved in CBD renewal and design, resort development, site development and individual building design and layout. His work has primarily taken place in Nicosia, United Kingdom, Middle East, Canada, Africa, France, South America and the Caribbean. He has travelled extensively to these areas as well as throughout North America and Europe.

Experience

1958 to date

Chief Architect and Director of Project Planning Associates and Senior Partner of Hancock, Little, Calvert Associates, a member of the Project Group. In this capacity of Chief Architect, Mr. Graham is directly responsible for all professional activities of the architectural company and department of approximately twenty people.

During the past few years he has been:

Chief Architect, urban designer and landscape architect for the Barbuda Master Plan and architectural schematics of development for the Island of Barbuda, West Indies.

Principal architect responsible for the design of a new cluster housing scheme for Washington area development and for housing in the new Meadowvale community for Markborough Properties Limited, Toronto, Canada.

Principal architect on interdisciplinary team responsible for all urban design and landscape architectural components for the Monaco Waterfront Development. This includes permanent and tourist oriented accommodation; such as, condominiums, hotels, cruise ship facilities, residential, commercial and entertainment establishments. During this period Mr. Graham was a member of the resident Monaco interdisciplinary team carrying out the design work.

Principal architect and member of the team responsible for all architectural work undertaken on the Kuwait Waterfront Development project including preparation of three dimensional representations of concepts and designs in forms of sketches and three dimensional models. Presently he is designing buildings and preparing site comments for marinas, ferry docks and a dhow harbour for the Kuwait development.

Chief architect responsible for detailed design of the University Centre and Administration Building, the Library and Arts Building, Phase I, University of Guelph, Guelph, Ontario, Canada. Mr. Graham was also a member of the Design Review Board set up by the University of Guelph to review all development aspects of the University program.

Principal architect responsible for the site development and architectural design of a tourist lodge and facilities for the Government of the Province of Nova Scotia, Canada. This lodge is now in operation and undergoing further expansion.

Principal architect responsible for site development, design, building renovation and additions and recreational facilities for Gray Rocks Inn, St. Jovite, Quebec, Canada, a summer and winter sporting area.

Chief architect responsible for site development, design and supervision of recreational oriented complex on Toronto Islands for the Metropolitan Toronto Parks Department. This work included restaurant, beach pavilion and concession pavilion design and construction supervision.

Chief architect responsible for all professional activities of the company's resident team in Guyana, South America. The work being undertaken is the Guyana Multilateral Schools Program for the International Bank for Reconstruction and Development. This project requires the Master Plan and design of a teachers' training college and six secondary schools.

1957-1958

Elie Mayorcas, London, England, architect responsible for the design of a technical school conversion at Tonbridge Wells and Gravesend Secondary Girls' School, Kent, England.

1953-1956

Harrison, Barnes and Hubbard, architect and site architect for construction of school for blind children and Teachers' Training College, Nicosia. Mr. Graham was also assistant site architect for the University of Ghana, where he obtained detailed background knowledge of tropical and semi-tropical site development and building design techniques.

Architect responsible for design of apartments for Barclays Bank, DCO, Accra, Ghana.

Canadian citizen; married with three children.

Speaks English, Greek and French.

Education Waterloo Lutheran University, Waterloo, Ontario, B.A. (Honours) Geography, 1966
University of Western Ontario, London, Ontario, M.A. Economic Geography and Resources and Management
Harvard University, Cambridge, Massachusetts, Certificate in Computer Graphics (SYMAP), 1968

Memberships Member, Regional Science Association
Member, Great Lakes Foundation
Member, Canadian Economics Association
Member, Canadian Association of Geographers

Experience

1967 to date

Acres. 1969 Economic Geographer, Hedlin, Menzies & Associates Limited. Evaluation of market potential, organization structure, sales and licensing strategy, and medium-term earning prospects of a pollution control company.

Preparation of a report for a major institutional investor on the market system and the ecosystem; identification and analysis of pollution control and recycling opportunities in Canada.

Review of existing regional modelling techniques and development of a socio-economic interface for a set of linear programming and simulation models developed for water quality management studies, Saint John River Basin.

Preparation of an annotated bibliography of socio-economic references (741 items) for water quality management studies, Saint John River Basin.

Analyses of benefits from alternative flood control structures, Lower Thames River Basin, Ontario.

Analyses of environmental factors affecting siting of pumped storage, nuclear- and fossil-fuelled electric power generation stations; aesthetic considerations in locating transmission line rights-of-way; the development of recommendations for improving communications; and site planning consultation between utilities, conservation groups, state agencies and the public in the New England States.

Forecasts of base load electric power demand in the Great Lakes basin region, 1968-2000; review of siting requirements of fossil- and nuclear-fuelled electric power generation stations; analysis of costs and benefits of projected thermal inputs into Lake Ontario in 1980.

1967 Economic Geographer, Acres Research and Planning Limited. Development of a set of flood-level damage curves for use in cost/benefit analyses of flood control works in Ontario.

Evaluation of methods of estimating the primary and secondary benefits and costs of multiple-purpose river basin development in Ontario.

Appraisal of a confidential industrial development proposal, including development of estimates of the North American and European markets, sources of development capital, alternative scales of production, and medium-term earnings.

Analysis of factors affecting location of the paper-converting industry and prospects of manufacturers of different paper products located in the Atlantic Provinces of Canada.

Development of market profiles and medium-term earning estimates as part of a study for a proposed Canada-wide, time-sharing and information-retrieval computer utility.

Specification and construction of an econometric model of the Atlantic Provinces of Canada.

Development of a predictive model of tourist traffic flows to Prince Edward Island, Canada.

Evaluation of the economic feasibility, financing, and optimum timing of the proposed Northumberland Strait Crossing, New Brunswick-Prince Edward Island, Canada.

Technical Publications

"The Structure of Land Use: Predictive Models" Ontario Geography, Vol. 5, No. 1, 1970, pp. 28-69.

Larry F. Hagadorn

1961-1963

Education University of Toronto, Toronto, Ontario,
B.Arch., Architecture, 1960

Junior Architect, Salter and Fleming, Architects, St.
Catharines, Ontario.

Memberships Member, Ontario Association of Architects
Member, Royal Architectural Institute of
Canada

Inspector of construction for the U.S.A. terminal buildings of
the Lewiston-Queenston Bridge.

Preparation of the working drawings for the principal building
of the St. Catharines Parks Board.

Experience

1960-1961

1963 to date

Junior Architect, L.A. Hesson, Architect, St. Catharines,
Ontario.

Architect, The Acres Group. Project Architect responsible for
the architectural design of:

Preparation of proposals, sketch renderings and working
drawings for a large residence, an apartment building and
several store alterations.

- The new Royal Canadian Mint, Ottawa, Ontario
- A new Citadel, The Salvation Army, Niagara Falls, Ontario
- An addition to the central utilities building, McMaster
University, Hamilton, Ontario
- A new office building, mill extension and boiler plant,
Eddy Forest Products Limited, Espanola, Ontario
- A subdivision master plan and feasibility report,
Huntington Development, Saint John, New Brunswick

Architectural studies and preliminary concept designs for a
report on the OMNIPLEX, a proposed covered stadium
(32,000 seats)/arena (12,000 seats)/theatre complex,
Edmonton, Alberta.

Responsible for the architectural design of:

- Tunnel crossings of the Welland Canal and their associated
buildings, Thorold and Welland, Ontario
- Four bridges over the approach highways of a tunnel
crossing of the Welland Canal, Welland, Ontario
- An extension of the central utilities building, Queen's
University, Kingston, Ontario
- The Northwest Chiller Plant, University of Toronto,
Toronto, Ontario
- An office building extension, Pittsburgh Metallurgical
Company, Niagara Falls, New York

Architectural designs for a two-storey addition to the Park
Motor Hotel, Niagara Falls, Ontario; and for the entrance and
control buildings, Manicouagan 2 Hydroelectric Development
(1,360,000 hp), Quebec.

Macklin L. Hancock

Born 1925, Nanking, China

Education B.S.A. University of Toronto (1949)

1949-50 and 1951-52 — studied under the tutelage of Dr. Walter Gropius, Dr. G. Holmes Perkins and William Holford (later Sir William and now Lord Holford)

Post-graduate education at Harvard University Graduate School of Design in Planning and Landscape Architecture.

Memberships Past President, Town Planning Institute of Canada, 1967-68

Past President, Canadian Society of Landscape Architects, 1964-66

Member, International Society of City and Regional Planners

Member, American Society of Planning Officials

Member, Board of Trade of Metropolitan Toronto

Member, Inter-American Planning Society

Member, International Federation for Housing & Planning

Member, International Fraternity of Lambda Alpha

Member, Society for International Development

Director, Social Planning Council of Metropolitan Toronto

Director, Bureau of Municipal Research

Formerly Member, Design Committee, National Capital Commission; Committee on the National Building Code of Canada

Formerly President, Harvard Graduate School of Design Alumni Association

Formerly National Councillor, Community Planning Association of Canada

Member, Visiting Committee of the Board of Overseers to the Graduate School of Design of Harvard University.

Experience

1956 to date

President, Project Planning Associates and all its subsidiaries and affiliates, responsible for management of this company and directing the firm's domestic and overseas projects as well as establishing the basic planning and design philosophy of the

company. He travels extensively and is a frequent participant in the major international planning conferences, to remain constantly conversant with contemporary practices in the resource utilization and development fields. This extensive experience as a planner and landscape architect, on several continents, has provided an important dimension of creativity and leadership in the work carried out by the firm. He also provided professional input in the firm's expanding planning practice, in which the design of major new communities in rapidly urbanizing regions has been of fundamental importance and influence. These projects have included Flemington Park, a high density urban community with industrial component; Borden Farm, a federal-provincial land assembly project in Ottawa; Don Valley Village and Bridlewood in Metropolitan Toronto; Clayton Park adjoining the City of Halifax; Century City for the Aluminum Company of America in West Los Angeles; the University Endowment Lands in Vancouver, a community for 50,000 people; and Lahore New Town, for the Pakistan Government intended to accommodate 100,000 people.

In the last six years he has spent a considerable amount of time overseas in connection with design review and quality control of the projects in Tanzania, Somalia, Kuwait, West Pakistan, Monaco, the Caribbean and Fiji.

Author of: Articles and Feature Articles in Traffic Quarterly — Transportation and Organic Urban Design; Plan Canada; Royal Architectural Institute of Canada Journal; A.S.P.O. Planning Policies for New Towns; Canadian Consulting Engineers and Ontario Housing publications.

1952-1956

Director of Planning, Don Mills Developments Limited and Canadian Equity & Developments Limited. Conception and planning of Don Mills New Town and direction of implementation team, for a balanced, integrated community north-east of Toronto, accommodating approximately 35,000 persons.

1946-1952

Partner, Woodland Nurseries, Cooksville, Ontario. Nursery and Landscape design practice. Projects included planning and design with father of Massey-Harris experimental farms, Unionville, Ontario and adviser to E.P. Taylor & Partners for layout and design of York Mills shopping centre.

Canadian citizen.

Speaks English, French.

A.L. Hayworth

Born 1931, Glasgow, Scotland

Education University of Strathclyde, Higher National Certificate, 1953

Memberships Member, Association of Professional Engineers of Ontario, 1955
Member, Institute of Civil Engineers (U.K.), 1955
Member, American Water Works Association, 1965
Member, Canadian Institute of Pollution Control, 1965

Mr. Hayworth is Chief Engineer of Project Planning Associates responsible for the Engineering Department which undertakes municipal, traffic and transportation, coastal and maritime and structural engineering, planning and design. He has been active in the municipal and traffic and transportation fields for sixteen years. He has been an active member of various interdisciplinary teams undertaking projects for this company and was the municipal engineer on the Dar es Salaam National Capital Master Plan project.

Experience

1964 to date

Chief Engineer for the past three years and municipal engineer. He has participated in the master planning and design of municipal services for the development of the Deuba Beach Property, Fiji and the design and capital works program and estimates for municipal services for the Master Development Plan in St. Lucia, West Indies.

He was responsible for the design of a storm sewer system and other servicing aspects of the University of Guelph in relation to the site development program.

Experience in water pollution control and refuse and waste collection and processing, has been attained through his work in Springhill, Nova Scotia, Canada; University of Guelph, Ontario, Canada and Dar es Salaam, Tanzania.

Municipal engineer responsible for design and production of contract documents of roads and services totalling \$3,000,000 for the community of Blackhead, St. John's, Newfoundland, Canada.

1962-1964

Canadian Mitchell Associates Limited, Toronto, Ontario, Canada; Project Engineer.

Mr. Hayworth was responsible for the design and construction of a well system of water supply and treatment plant producing approximately 3 mgd; also for the design and construction supervision of an elevated steel storm tank having a capacity of 1.0 mg.

1961-1962

Marshall, Macklin, Monaghan Limited, Toronto, Ontario, Canada; Project Engineer.

Mr. Hayworth was responsible for the location and design of 42 miles of highway in northern Quebec; the design and construction supervision of 2 miles of welded steel watermain including tunnel section installed under compressed air and wellpoint system.

1959-1961

Babbie, Shaw and Morton, Glasgow, Scotland; Project Engineer.

Mr. Hayworth was responsible for the location and design of contract drawings and documents for 9 miles of 4 lane, limited access highway.

1954-1956

Marshall, Macklin, Monaghan Limited, Toronto, Ontario, Canada; Project Engineer.

Mr. Hayworth was responsible for the design and construction supervision of several land development contracts; design and construction supervision of services and facilities at Camp Borden, Ontario, Canada; location and design of 23 miles of highway in northern Ontario; design and preparation of contract document for several pumping stations and sewage treatment plants for communities; chief concrete inspector on 24 sites covering 1,500 miles in the Canadian Arctic; design and construction supervision of roads and municipal services for Don Mills New Town.

British citizen.

Speaks English.

John A. Head

Education University of Western Ontario, London, Ontario, B.A., 1965, M.A., Economics, 1967

Memberships Member, Canadian Transportation Research Forum
Member, American Transportation Research Forum
Member, Toronto Association of Business Economists

Experience

1970 to date

Acres. 1970 Economist, Hedlin, Menzies & Associates Limited. Project Leader for a study of the feasibility of constructing and operating a diversified fish processing plant in the Argentinia area of Newfoundland. The study involves investigation of all aspects of the state of the fishing industry in the area (existing facilities, employment, transportation), determination of resource potential, cost and employment estimates, and a cost/benefit study.

Project Leader for a study (private client) providing an independent review and preliminary assessment of a proposal concerning certain aspects of manufacturing and transportation in Northern Ontario.

Project Leader for a study for a major shipping company. The study included commodity flow forecasts and an analysis of the company's internal operations, profitability and investment potentials.

Responsible for portions of Phase I of a study for the Canadian Transportation Commission concerning the implications of containerization on the Canadian transportation system and economy.

1967-1970

Economic Analyst, Shell Canada Limited, Toronto. Involved primarily with project profitability analysis.

Seconded to ShelPac Research and Development Limited (jointly owned by Shell and Canadian Pacific Rail), 1969-1970, as one of the initial staff of ShelPac.

Project Leader for a study of the feasibility of a pipeline system to transport an ore concentrate in Western Canada.

Project Leader for a study of the economic viability of a system to gather a bulk commodity by pipeline, and deliver it for transshipment by rail.

Responsible for accumulation and dissemination of information on: various bulk commodities, oil and gas industry, economic analysis, energy policy and regulation, and manpower.

Evaluation of the economics (lease versus purchase) of all new furniture and major equipment for the company, prior to its formation.

Shell Canada Limited, Pipeline Department: assigned to the sulphur project team, 1968-1969. Performed the economic and statistical studies for the major sulphur pipeline system proposed by Shell Canada.

Assigned to the Economics Section, Shell Canada Limited 1967-1968. Assisted with studies investigating various aspects of pipeline companies in which Shell holds interest, particularly with respect to capital expansion programs.

Assistance on projects designed to determine the supply of and demand for certain bulk commodities, and the economic feasibility of their transportation by pipeline.

Assistance in the development of statistical information concerning comparative transportation economics, international trade and the sulphur industry for Parliament during the formation of the Shell Canada subsidiary, Commercial Solids Pipeline Company.

1965-1967

Tutor, Department of Economics, University of Western Ontario, London, Ontario.

Kenneth Heatherington

Education Sir George William, B.Sc., Mathematics and Physics, 1945

Memberships Member, Association of Professional Engineers, Ontario
Member, American Water Works Association

Experience

1948 to date

Acres. 1970 Senior Engineer, Mechanical, H.G. Acres Limited. Expansion of research and pilot plant facilities, including building extensions; arrangement of mechanical equipment and services; electrical distribution system studies; process instrumentation; design of potable water distribution system for a complete plant; preparation of all contract documents, INCO, Port Colborne, Ontario.

Waste-water disposal systems, including a review of and recommendations for modification to existing disposal systems; preparation of design criteria; detail layout and design of piping systems; equipment and installation specifications, Niagara Mohawk Power Corporation, Dunkirk, N.Y.

Report on treatment and disposal of acid mine wastes and a feasibility study on installation of 5 miles of new water line, INCO, Copper Cliff, Ontario.

Evaluation and selection of mechanical equipment for the coin production of the proposed Royal Canadian Mint.

1967 Project Co-ordinator. High-lift sewage pumping station, 33 Mgd, including feasibility studies, layout and design of a pumping station and sewers, selection of pumps and equipment, preparation of contract documents and construction supervision, The Regional Municipality of Niagara, Ontario.

Expansion of a grinding and flotation system for processing tungsten ore, including preparation of construction and installation drawings for foundations, buildings, plant service systems, materials handling systems and process equipment; preparation of specifications; evaluation of tenders; design of a 50-foot diameter steel ore storage bin and table feeders; installation of flotation cell lines and conveyors; design and installation of a project instrumentation system, Union Carbide Corporation, Bishop, California.

Expansion of facilities, by the electrolytic process, for production of chromium metal, including installation of vacuum filtration facilities, a leach filtration system, a chrome alum vacuum filter and auxiliaries, and a crystallizer unit with instrumentation system, Union Carbide Corporation, Marietta, Ohio.

Expansion of an extraction process plant producing tantalum and columbium oxides from crushed ores and by-product slag, Union Carbide Corporation, Marietta, Ohio.

A naphtha pumping and metering station, a pyrolysis gasoline pumping and metering station, and an ethylene compressing and metering station, B.A. Oil Company Limited, Montreal East, Quebec.

A septic tank disposal field for Canadian terminal buildings at Queenston-Lewiston Bridge, Ontario-New York.

1948 Technician. Co-ordination of engineering for expansion of production facilities of a bleached kraft pump mill, Brown Forest Industries Limited, Ontario.

Preparation of designs and specifications for a 12-inch 5,000-foot long steam line and a 6-inch underground oxygen line for DOFASCO.

Preparation of layout and piping drawings, assistance with selection of specifications, and evaluation of tenders, Stamford-Niagara Pollution Control Plant, Ontario.

Preparation of a report on sanitary and storm drainage sewers for the campus of Brock University, St. Catharines, Ontario.

Layouts, designs and specifications for drainage, buried services, mechanical services, and auxiliary equipment and piping for commercial buildings and hydro-electric power developments.

1946-1948

Design Draftsman, Consolidated Paper Corporation Limited, Grand'Mere, Quebec

1941-1946

Draftsman, Canadian Vickers Limited, Montreal, Quebec

1938-1941

Draftsman, Aluminium Laboratories Limited, Quebec

Harry M. Hill

Education University of Saskatchewan, Saskatoon, Saskatchewan, B.Sc., Agricultural Engineering, 1956, M.Sc., Hydraulics, 1961
Oxford University, England, D.Phil. Sediment Transport, 1965

Memberships Associate Member, American Society of Civil Engineers
Member, Association of Professional Engineers, Ontario

Experience

1971 to date

Acres. 1971 Environmental Engineer Consultant, H.G. Acres Limited.

1964-1971

Associated Professor, University of Waterloo, Ontario. Responsible for development of hydraulics, hydrology and water resource planning of postgraduate and undergraduate programs; supervision of research degree candidates at the doctoral and master's level.

Co-director of a sanitary landfill applies research contract; setting of guidelines for placement of sanitary landfills in Southern Ontario.

Director of a research contract to develop a flow regime model for Grand River Conservation Authority.

Consultant to Planning Division, Department of Energy, Mines and Resources, Canada, 1970.

Consultant to Okanagan Basin Board on development of a comprehensive water resource planning program; supervising alternative generation and evaluation; Director of Review Board, 1970.

Consultant to Saint John River Committee for development of a planning program, 1970-1971.

1961-1962

Athlone Fellow, Hydraulics Research Station, England. Scientific studies on side-spill weirs and mobile bed models.

1961

Project Engineer, Strong Land and Nelson, Regina, Saskatchewan. Supervision of subdivision construction.

1956-1960

Engineer, Prairie Farm Rehabilitation Administration. Model studies of spillway and outlet works, South Saskatchewan Dam; land-use planning in community pastures, layout of fences, stockwatering, grassland management; construction supervision of irrigation projects.

Technical Publications

"Side Spill Weirs with Falling Profile, Hydraulic Aspect of Performance and Design" Hydraulic Research Station, Report No. INT 33, Wallingford, England, November 1963.

"An Investigation of the Applicability of Fluvial Hydraulic Formulae to Laboratory Scale Loose Boundary Channels" Hydraulic Research Station, Report No. INT 34, Wallingford, England, March 1964.

"Bed Forms Due to a Fluid Stream" Proceedings ASCE, March 1966.

"Variation in Statistical Measures with Length of Streamflow Record" Proceedings, International Hydrology Symposium, 1967 (with B.P. Sangal and T.E. Unny).

"Problem Definition in Watershed Planning" Presented to Great Lakes Conference, Madison, Wisconsin, March 1968. Accepted for publication in proceedings.

"Pressure Fluctuation and Downstream Force on a Sluice Gate" ASCE Hydraulics Division, November 1969 (with T.E. Unny and G. Keir).

"Flow Retardance in Vegetated Channels" ASCE Irrigation and Drainage Division, June 1969 (with T.E. Unny and N. Kouwen).

"Bed Forms in Alluvial Channels" ASCE Hydraulics Division, September 1969 (with V.S. Srinivasan and T.E. Unny).

"Data Preparation for Water Resource Studies" Presented to Conference on Great Lakes Research, Buffalo, New York, April 1970 (with G.A. Fuller).

"The Hydraulic Construction of Mine Tailings Dams" Canadian Mining Journal, June 1970 (with B. Hoare).

"Water Resources Planning in the Okanagan Basin" Presented to OECD Conference, Hamilton, Ontario, August 1970. Invited paper (with R.C. Hodges and R. Koop).

"Phase 1 Report, Sanitary Land Fill Study" Ontario Department of Health and Grand River Conservation Authority, January 1970, with R. Farvolden, G.J. Farquar and B. Weatherbe.

"On the Occurrence of Bed Forms in Alluvial Channels" International Association of Hydraulic Research Conference, Paris, September 1971 (with A. Robinson and V.S. Srinivasan).

"Phase 2 Report, Sanitary Land Fill Study" Ontario Department of Health and Grand River Conservation Authority, April 1971 (with R. Farvolden, G.J. Farquar and V.S. Srinivasan).

Ian K. Hill

Education University of Canterbury, Christchurch, New Zealand BE (Honours), Civil Engineering, 1962, B.Sc., Mathematics, 1964, Ph.D., Civil Engineering, 1967

Memberships Member, Association of Professional Engineers of the Province of Ontario

Experience

1968 to date

Senior Engineer, Hydraulic, The Acres Group. Responsible for technique co-ordination for the development of a set of mathematical simulation models to study the effects of water quality management on sociologic and economic development with particular reference to the Saint John River basin, New Brunswick. The models have accommodation for the effects of legal and political constraints.

Responsible for the detailed analysis of hydrology and hydraulic data, including streamflow generation and pollutant load routing, for the water quality management studies of the Saint John River basin.

Development of conceptual models (large scale, local) of heat transportation (convection, advection, diffusion) in Lake Ontario, based on the transient behaviour of the lake; and development (to programming stage) of a mathematical model of a local condition close to shore.

Studies of erosion and required protection for a specific stretch of the north shore of Lake Erie, Ontario.

Responsible for the co-ordination of the hydrology studies and hydraulic designs for the Churchill Falls Power Project (7,130,000 hp), Labrador, Newfoundland.

1967-1968

Senior Visitor, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, England. Research studies and engineering consultations on the hydraulic transportation of solid particles.

1965-1967

Lecturer (1966-1967), Assistant Lecturer, Department of Civil Engineering, University of Canterbury. Instruction to second-year students in fluid mechanics theory, development and supervision of laboratory courses, and design of testing equipment including an experimental tilting flume 100 feet long.

Analysis and interpretation of tests on a gravel dredging system.

Consultation designs for special pumps and piping for a dredging in a confirmed salt-water area.

1962-1967

Postgraduate Student, University of Canterbury.

1958-1962

Undergraduate Student, University of Canterbury.

1956-1958

Cadet with Duffil, Watts and King, Consulting Engineers and Surveyors, Invercargill, New Zealand.

Site surveys and engineering designs for road works and bridges (60-foot maximum span).

Technical Papers

"Riverbed Behaviour at a High Shear Stress" International Union of Theoretical and Applied Mechanics, Symposium on Fluid-Solid Mixtures, University of Cambridge, March 1969.

"Runoff Hydrograph as a Function of Rainfall Excess" Water Resources Research Journal, February 1969.

"Fluvial Sediment Transport at a Large Bed Shear Stress" Ph.D. Thesis, University of Canterbury, 1967.

Education Mount Allison University, Sackville, New Brunswick, B.S. (Honours) Chemistry, 1938
McGill University, Montreal, Quebec, Post-graduate Studies in Physical-Organic Chemistry, 1938-1939.

Memberships Member, Association of Professional Engineers, Ontario
Member, American Institute of Chemical Engineers

Experience

1968 to date

Acres. 1970 Executive Engineer, H.G. Acres Limited, 1968 Executive Engineer, Acres Quebec Limited. Administration and direction of the engineering for projects, particularly industrial, including:

- equipment, systems and structures for a central utilities building and a process water supply works for a chemical plant;
- evaluation of particulate removal systems applicable to stack gases of coal-fired power generating plants;
- selection and installation of high temperature electrostatic precipitators on the stack gases of a 600-Mw thermal power station, including a fly ash recovery system;
- design and installation of power station waste water treatment facilities incorporating a bottom ash removal system with sluice water recycle.

1966-1968

Manager of Engineer, Member of the Management Committee, Brunswick Mining and Smelting Corporation Limited, Belledune, New Brunswick. Direction and administration of engineering for the company's mine, concentrator and smelter divisions.

1965-1966

Manager, Tectonics Limited, Consulting Engineers, Saint John, New Brunswick. Responsible for engineering services supplied to the mining and smelting industries, including the design, selection and installation of chemical plant equipment and production facilities for ammonia ex naphtha and diammonium phosphate.

Shawinigan Chemicals Limited

1956 Chief Engineer. Administration of engineering department and consulting to management. Member, Management Committee, for development of major facility expansions by outside engineering firms, including a new petrochemical plant at Varennes, Quebec.

1953 Assistant Chief Engineer. All phases of engineering, including design drafting, construction and maintenance supervision and personnel and field administration.

1950 Office Engineer. Process design, co-ordination of associated civil and mechanical engineering, drafting, material procurement and cost control.

1947 Head, Engineering Development Department. Design of all process revisions, and new process installations, including a vapor phase process.

1945 Instrument Engineer. Design, selection and installation of all process instrumentation.

1943 Process Engineer. Supervision of process producing acetic anhydride, acetic acid and vinyl acetate.

1939-1945

Plant Control Chemist, Canadian Industries Limited. Participation in laboratory analysis and studies, research and development, and pilot plant operation.

K. Holland

Born 1926, Tallinn, Estonia

Education Technical College, Klein Henbach, Estonia
University of Technology (Engineering),
Sydney, Australia

Mr. Holland has been senior project engineer with Project Planning Associates, and is now partner in Project Engineering Associates, a division of Project Group specifically established to carry out municipal, traffic and other civil engineering design and execution. In the capacity of Senior Municipal Engineer, Mr. Holland's more than fifteen years of experience includes engineering feasibility studies for municipal servicing, water purification and waste treatment, design and supervision of Bridlewood and Meadowvale Community Development in Toronto, engineering design and supervision of the University of Guelph campus development, design and supervision for Don Mills Road extension in Metropolitan Toronto, cost analysis and structural design for the Canadian Corporation for 1967 World Exhibition.

Experience

1962 to date

Mr. Holland is at present Municipal Engineer in charge of all roads and other infrastructural design work on the Kuwait Harbours project. This work includes all storm and sanitary sewerage, site lighting, fuel supply and storage, roads and parking lots; for five Sea Clubs (marina harbours for 250 boats); two Ferry Terminals which link Kuwait to its island dependencies; and the new 200 acre Dhow Harbour for coastal traffic vessels. This harbour has 2000 metres of dock with the back-up of 85 buildings including storage godowns, administrative offices, quarantine and animal isolation health facilities.

Thus overseas, Mr. Holland has been involved in engineering design of waterfront and sea club's developments in Kuwait, in three of our Caribbean projects, and preliminary engineering design for harbour development in Monaco, all of which have necessitated his absence abroad for protracted periods.

1954-1962

Prior to joining the firm in 1962, Mr. Holland was employed by Marshall, Macklin, Monaghan Limited, consulting engineers, where he was involved in engineering design for the Elliot Lake Townsite Development; Don Mills Community Development; Don Valley Village Development; and Yorkdale, Thorncliffe Park and Cedarbrae Shopping Plazas.

Education University of Toronto, Toronto, Ontario, B.A., Economics and Political Science, 1958
Massachusetts Institute of Technology, Massachusetts, Ph.D., Economics
(Course work complete; degree to be awarded on completion of thesis)

Economist, Research Department, International Chemical Workers Union, Akron, Ohio. Responsible for collecting and analyzing data relating to Canadian economic conditions, wages and fringe benefits, financial position of firms in chemical industry, degree of union organization, etc.

Lecturer for courses in economics and industrial relations at trade-union schools and seminars.

Experience

Responsible for study on labour costs as a factor in world competition in the chemical industry.

1968 to date

Senior Economist, Hedlin, Menzies & Associates Limited, Toronto Regional Office. Director of a continuing economic forecasting service provided for several major clients.

Advisement to the Department of Consumer and Corporate Affairs in the establishment of the Prices and Incomes Commission and to a number of business firms and associations.

Contribution to a study on the economic feasibility of establishing a Canadian Deep Sea Merchant Marine and to an examination of the potential for containerization in the Canadian transportation system.

1966-1968

Chief of Economic Conditions Section, Canadian Department of Manpower and Immigration. Responsible for continuous analysis and regular forecasting of economic and employment conditions; senior advisor to department on the implications of the economic and employment outlook for manpower and immigration policy; represented department at interdepartmental and international meetings, dealing with the role of manpower programs in general economic policy.

1963-1966

Director of Research, Canadian Labour Congress, Ottawa. Responsible for all economics research carried out by the C.L.C.; senior advisor to the president and other officers of the C.L.C. on economic matters; responsible for developing policy on major economic issues, for submission to Convention; prepared and assisted in the preparation of briefs to Cabinet, Royal Commissions, and Parliamentary Committees; undertook many public speaking engagements and represented the C.L.C. on several multipartite bodies, including the Canadian Trade Committee, the National Employment Committee and several international conferences; labour representative on the Board of Governors of Algonquin College.

1961-1963

Director of Research, New Democratic Party of Canada, Ottawa. Senior advisor to the leader, the parliamentary caucus, and the national executive and council of the party, on a wide range of policy issues, particularly economic matters.

Responsible for providing regular information on economic issues to the general membership.

Walter H. Kehm

Born 1937, New York, U.S.A.

Education New York State College of Forestry at Syracuse University, 1955-1960, Bachelor of Science in Landscape Architecture
Harvard University, 1960-1962, Master of Landscape Architecture

Memberships Associate, American Society of Landscape Architects
Member, Canadian Society of Landscape Architects

Mr. Kehm is Chief Landscape Architect of Project Planning Associates Limited responsible for this Department, which undertakes regional studies, planning for recreation, studies in urban landscape as well as design and execution of landscape work.

Experience

1964 to date

As Chief Landscape Architect, Mr. Kehm has participated on Landscape planning design projects throughout Canada, the United States, Pakistan, the Caribbean and Europe. He is concerned with the effects on the landscape as a result of development and means to preserve ecological systems and their intrinsic values. At the regional scale of landscape analysis he has been involved with master plan studies for the islands of St. Lucia, the Bahamas and Fiji.

Mr. Kehm was a participating member of the Environment and Ecology Task Force of the Mid-Canada Development Conference which studied the Canadian Boreal forest region giving particular emphasis to the Mackenzie River Valley. The findings of this Task Force were submitted to the Federal Government of Canada.

As Regional Planner, he was the team member responsible for preparing land analyses and evaluations for the regional planning project for the Ottawa National Capital Region. He prepared the regional land use plan related to agriculture, forestry, wildlife, fishing and recreation.

As a Resource Planner, Mr. Kehm was responsible for the preparation of landscape capability studies for a regional planning project for the Dar es Salaam National Capital Region, Tanzania.

For the Ontario Hydro Electric Commission he was responsible for a landscape planning project which included ecological analyses and evaluations to determine the impact of the proposed generating plants on the natural environment, i.e., oil, coal and nuclear powered generating stations.

As Chief Landscape Architect of the firm Mr. Kehm has been responsible for a regional landscape planning and construction project for the implementation of the St. Lawrence Seaway Authority's relocated Welland Canal. He has been responsible for co-ordinating all planning and design aspects of this 10½ mile canal. Plans for grading 66 million cu. yd. of excavated soil in order to create new potentially usable land areas have been prepared followed by detailed landscape and planting plans. This major land restoration project is presently under construction.

He has participated as landscape co-ordinator for the University of Guelph, where he was responsible for planning and implementation of the \$200 million master plan. Detailed designs have been implemented for fifteen buildings, major roads and athletic facilities.

Mr. Kehm was responsible for a landscape study for Laval University to preserve their existing trees and to determine how landscape elements could be used to control climatic condition (i.e., wind, snow). A series of physical studies were made resulting in recommendations for tree location, species, maintenance requirements and capital costs.

In addition, he has prepared plans for Cambrian College, Carleton and Queen's Universities.

Present assignments are involved with community participation projects to determine social and recreation needs of low income neighbourhoods in Toronto, Guelph, and Ottawa. A community development plan has been completed for one of the largest housing projects in North America which includes new concepts in playgrounds, after school programs, family and health facilities and adult retraining. Parks and recreation studies and the preparation of planning programs have been completed for the new towns of Malvern and Meadowvale in the Toronto Region.

Mr. Kehm has undertaken academic assignments such as lecturing at Louisiana State University, Harvard University, University of Guelph, and York University. In addition, numerous public addresses have been given at conferences and professional societies.

He has recently been Project Co-ordinator for the preparation of master plans and implementation drawings for Ontario Hydro's Pickering and Nanticoke electricity generating plants. Detailed landscape and ecology studies have been completed for each station.

1962-1964

Mr. Kehm spent two years of national service with the United States Army Corps of Engineers in Germany. He followed this break in his career to utilize the Weidenman Fellowship presented by the Harvard University School of Design for excellence in design. He travelled extensively in Italy, southern France and Spain to study the relationship of landscape to urban form and the detrimental effects on the environment as a result of over use of land and water resources.

1961-1962

Cambridge Planning Board, Cambridge, Massachusetts, Design Consultant.

Mr. Kehm was a team member on the design of several urban renewal and park projects.

1960-1962

Moreice and Gary, Cambridge, Massachusetts, Landscape Architect. Design and execution of high school, housing and park landscape.

American citizen.

Speaks and writes German and English.

Education City and Guilds College, Imperial College of Science and Technology, University of London, London, England, B.Sc. (Honours) Chemical Engineering, 1949

Memberships Member, Association of Professional Engineers, Ontario
Chartered Engineer, Council of Engineering Institutions, U.K.
Member, Institution of Chemical Engineers, U.K.
Associate Member, City and Guilds Institute, U.K.
Associate Member, Royal Institute of Chemistry, U.K.

Experience

1969 to date

Acres. 1971 Vice-President and Project Manager, Acres Consulting Services Limited, Toronto, Ontario. Business development, conceptual and technical development, and management of projects for solid and liquid industrial waste treatment by biological, physiochemical and thermal processes.

Final completion and commissioning of float glass plant, Pilkington Brothers (Canada) Limited.

1970 Vice-President. Responsible for finance, personnel, business development, management, information systems and general administrative services.

1969 Project Manager and Manager of Engineering, H.G. Acres Limited. Direction and supervision of engineering and construction departments for industrial and institutional projects.

1967-1969

Director and General Manager of the Process Equipment Division, Air Products Limited, London, England. Sales, engineering, procurement, manufacture and operation of cryogenic plant for the liquefaction of air and hydrocarbon gases including:

- tonnage oxygen and nitrogen plants;
- hydrogen purification plants;
- helium and other gas recovery plants;
- base and peak shaving LNG plants;
- cryogenic static, road and rail storage tanks.

Design, manufacture and marketing of a range of factory-built industrial waste and sewage treatment plants.

1965-1967

Chief Engineer, Bechtel International Limited, London, England. Responsible for process, chemical, civil, mechanical and electrical engineering and drafting for major refinery and petrochemical projects in Sweden, Philippines, Belgium and the U.K., for British Petroleum, Shell Oil, Texaco, Regent Oil and Gulf Oil.

1962-1965

Director and Deputy Manager of Engineering, Humphreys and Glasgow Limited, London, England. Responsible for engineering, procurement and construction for chemical, metallurgical, fertilizer and petrochemical plant projects.

1961-1962

Project Manager, Matthew Hall and Company Limited, London, England. Management of the design and construction of chemical and petrochemical projects, including polyethylene and polypropylene plants for Shell Oil, and ammonia, lube oil and refinery plants for Esso.

1955-1960

Division Engineer, Piping Engineering Division, Project Manager, Kellogg International Corporation, London, England. Responsible for engineering for flow sheets, piping and drawings for all projects.

Engineering manager for petrochemical and industrial projects, including ethylene plants in England and France, a reforming unit in Belgium, and a refinery in Karachi.

1949-1955

Project Engineer, W.J. Fraser and Company Limited, Essex, England. Engineering, design and supervision of shop fabrication and erection of buildings, service systems and processes for chemical pharmaceuticals, explosives, organic resins, paint, soap, food and tobacco industry projects.

Special Studies

Computer program development and application using the ALGOL and FORTRAN languages.

General business management including network analysis, critical path methods and statistics.

ALCHEE, Continuing Education Program on Project Management.

Special studies into waste treatment processes and equipment.

J.S. Khurana

Born 1934, Punjab, India

Education Bachelors in Architecture, Delhi University, 1958
Masters in Landscape Architecture, Harvard University, 1961
Masters in Urban Design, Harvard University, 1964.

Memberships Member, Canadian Society of Landscape Architects
Member, American Society of Planning Officials

Experience

1969 to date

Project Planning Associates Limited and Hancock, Little, Calvert Associates, Toronto. Projects: Urban Designer - Meadowvale New Town population 90,000; Urban Designer - On loan to New Montreal International Airport Project Passenger Terminal Area 1,200 Acres, Geometry and Program Integrated Airport System; Urban Designer - Malvern Master Plan, housing and town centre population 50,000.

1968-1969

(Leave of absence from Project Planning Associates Limited). David & Boulva/Erickson & Massey Architects, Montreal, Urban Designer on a high density high rise community of 20,000 over a 60 acres of C.P. Railroad air-rights in Montreal.

1967-1968

St. Lawrence Seaway Authority, Montreal. Urban Design Consultant and Site Architect, Welland Channel Relocation, Hydraulic Labs and Workshops, Lakeview Cemetery, Control Towers.

1966-1967

Affleck, Desbarats, Dimakopoulos, Lebensold and Sise, Architects Montreal. Urban Designer - Calgary Downtown Core East end Urban Renewal, Town of Tuxedo 9-acre site feasibility study for high rise and town housing.

1964-1966

Project Planning Associates Limited, Toronto. Projects: Burnaby Town Centre, planning and design, Worlds Fair, Montreal, Expo '67, program, planning and design National and International Pavillion Area of Ile Notre Dame and Ile Verte. Implementation of landscape architecture and environmental design. Responsibilities: Urban designer, project landscape architect. In charge of Project Planning Branch office in Montreal for the implementation of the scheme.

1963-1964

Harvard Graduate School of Design. Department of Urban Design, Cambridge, Massachusetts. One year program for the Masters course in urban design.

1961-1963

Royston, Hanamoto, Mayes & Beck, Site Planners, San Francisco, California. Projects: a 4-month study of the San Francisco Medical Institute, Master Plan for 1980, St. Louis Low Cost Housing, Foster City Lagoon Housing, Competition-Copley Square, City Hall, Boston, Richmond Downtown, Redevelopment Plan. Responsibilities: Project Design Co-ordinator.

Travelled through France and India.

University of California, Berkeley, School of Environmental Design, Assistant Lecturer.

Travelled through United States on Jacob Weidenmann Fellowship.

Harvard Graduate School of Design, Department of Landscape Architecture, Cambridge, Massachusetts. Two-year program for the Masters course in Landscape Architecture.

1959-1961

Sasaki, Dawson & Demay, Architects & Landscape Architects, Watertown, Massachusetts. Part-time through school terms and full time through summer of 1960 and 1961. Projects: Baghdad University Campus, environmental and site design; Constitution Plaza, Hartford, Connecticut; Baltimore Downtown Master Plan; Southern Illinois Campus Master Plan. Responsibilities: Architectural Draftsman and Assistant.

1952-1958

School of Architecture, Delhi University. Bachelors course in Architecture.

Canadian citizen, married with two children.

Speaks English, Hindustani.

Attila Koves

Education Commercial Technical School, Pecs, Hungary,
Diploma, Commercial Technician, 1952
University of Economics, Budapest, Hungary,
B.A., Faculty of Industrial Economics, 1956

Experience

1970 to date

Research Economist, Hedlin, Menzies & Associates Limited, Toronto Regional Office. Participated in a study examining the world groundfish industry, prepared for the Department of Fisheries and Forestry.

1969-1970

Proprietor of City Laboratory Company, Toronto.

1966-1969

Salesman, Starkman Chemist Limited, Toronto.

1965-1966

Partner, "Extra Moden" Company, Vienna, Austria.

1961-1965

Director of Planning: Planning Statistics and Manpower Development Division, Tourist Industry Branch; Ministry of Internal Commerce, Budapest.

Responsible for the creation, implementation and finance of development programs for hotels, motels, restaurants and department stores.

Responsible for related economic research and statistics, including labour force planning.

1957-1961

Chief, Planning Statistics and Manpower Development Division; Consumer Sales Company, of Baronya District, Pecs, Hungary. Responsible for planning of inventory control, labour force and profitability.

1952-1956

University student, field of specialization in industrial economics.

Noboru Koyama

Born 1925, Vancouver, British Columbia, Canada

Education Studied at University of Toronto in Humanities centering on philosophy
Vocational training in graphics and design presentation
Under direct planning and urban design tutorship of Mr. Macklin L. Hancock for a period of eighteen years.

Memberships Member, Town Planning Institute of Canada.

Mr. Koyama is Vice-President of Design Integration; a Director and Chief Urban Designer of Project Planning Associates. He is responsible for the interdisciplinary design integration of all projects undertaken by Project Planning Associates, and is responsible in this capacity to the President. This requires Mr. Koyama to ensure that any project has the proper composition of physical, social, planning, economic and engineering components to produce a rational and orderly plan. He has particular capability in graphic expression and personal persuasion with the logic and objectiveness of his approach within the teams. Because of his background and studies he is able to converse with interdisciplinary professionals on a philosophical, social and moral basis. Mr. Koyama, utilizing his urban and physical design experience imposes upon a plan a very intimate knowledge with respect to people, their social and cultural desires, their wants, needs and necessities combined with the restraints imposed by the terrain and other physical factors of the area under study. Mr. Koyama, physically and graphically lays out the proposed plans and/or settlements as documented and projected by the planners, and other members of the team. These graphical representations contain a quality of design for communities and regions over and beyond their functional and mathematical soundness. He fulfills his professional responsibilities on both the national and international projects undertaken by this company. Mr. Koyama has been a visiting lecturer to the Graduate School of Design in urban design at Harvard University, U.S.A. He has undertaken work primarily in Canada, and in U.S.A., the Caribbean, Australasia, Fiji, the Bahamas, Pakistan and Tanzania.

Experience

1956 to date

Vice-President of Design Integration; Director; Company Officer and Chief Urban Design and Physical Planning Department. In this capacity his work includes:

Preparation of plans of subdivision, including discussions with clients, collection and evaluation of data, conceptual and detail design, obtaining approvals from the client and from municipal and provincial agencies, and implementation of the plan;

Examination and critique of plans of subdivision for our firm's municipal clients;

Preparation of comprehensive development plans for urban and rural municipalities and regions;

Preparation of comprehensive large-scale land development plans for private clients, including entire new communities, industrial estates, recreation areas, etc.;

Preparation of urban design aspects of urban renewal schemes;

Preparation of official plans and zoning by-laws for municipalities in Ontario and elsewhere in Canada;

Preparation of annexation studies for several Ontario municipalities;

Preparation of Master Development Plan for the City of Dar es Salaam in Tanzania;

Preparation of a 1,700 acre low-cost housing estate in Lahore, Pakistan;

Preparation of large-scale comprehensive resort development plans in Fiji and Bahamas; and

Preparation of master campus plan for the University of Guelph.

1952-1956

Assistant to Planning Director, Don Mills Developments Limited, New Town for 35,000 north-east of Toronto. In this capacity Mr. Koyama carried out planning surveys; assisted in town site model building for evaluation and presentation purposes; assisted the Director of Planning, Mr. Hancock, with the design of the community; analyzed and evaluated planimetric and cadastral surveys, design and siting of housing units, prepared and detailed first draft plans of subdivisions and prepared graphics and all plans and ideas in order to ensure proper communication to the Coient and the various government and municipal bodies.

He was involved in the siting and design of the initial shopping centres established in Canada as generated and fostered by Dominion Stores and Canadian Equity and Developments Limited.

Mr. Koyama had a central responsibility for the planning of recreational areas and for the master planning of Atikokan, Ontario, the new town in the iron resources portion of the Province; the design of a new community adjacent to Kingston, Jamaica; for the master planning of a new community for the Borden Farm near Ottawa, this work being the first given out to consultants in planning for Canadian public enterprise; for the land capability and planning studies undertaken by the company for the urban metropolitan expansion of the Erin Mills Area (outside Toronto, Ontario, Canada) and route location studies for a proposed superhighway between Toronto and Hamilton which is now projected for construction.

Prior to 1956 Mr. Koyama undertook his education and served with the British Army Intelligence Unit in World War II in Assam and Burma.

Canadian citizen; married with six children.

Speaks English and Japanese.

Jonathan Thomas Michael Kurpias

Born 1946, Chicago, Illinois, U.S.A.

Education University of Illinois, Chicago
Bachelor of Science in Applied Mathematics
B.A. in the Arts, 1968

Experience

1969 to date

Director of Statistical Programmes in Motivational Research; Project Group of Companies; Hancock, Little, Calvert Inc., in Interthink Limited. In this capacity his work includes:

Analysis of data for translation into statistical motivational research concepts, development of research techniques, and analysis of motivational research results for final report, presentation of statistical results in meetings with clients, and the preparation of costing as related to research programmes.

Examination and critique of research programmes for Firm's clients:

Preparation of statistical research segments of programmes for the municipalities of Ontario;

Preparation of user and non-user research for the Department of Parks and Recreation, Ontario;

Preparation of large scale motivational research programmes for the Department of Indian Affairs, Ontario.

Vice-President and Co-Founder of Interthink Limited and Intersearch. Director of Statistical Programmes in Motivational Research. In this capacity his work included:

Analysis of data for translation into statistical motivational research concepts, development of research techniques, analysis of motivational research results for final report, presentation of statistical results in meetings with clients, and the preparation of costings as related to research programmes.

Preparation of large scale research programmes for consumer industries; Examination, analysis, and recommendations for marketing of consumer and trade publications, (Canadian Securities Gazette; MacLean Hunter Publication; Caribbean Business News) and consumer goods; (Kendall Company; Libby MacNeil & Libby; Duragloss Cosmetics); Consultant for industry in employer-employee relationships in a motivational research capacity; (Electric Reduction Company of Canada Ltd.); Consultant for industry' in information dissemination concerning the pollution problem in motivational research terms (Soap and Detergent Industry Association).

1968 to 1969

Communications Co-ordinator, Department of Parks and Recreation, Chicago, Illinois. In this capacity Mr. Kurpias' work included:

Interpretation of motivational research and statistical data in audio-visual interpretations;

Co-ordination of communications input and output;
Creation of effective fund raising guidelines.

Mechanical Engineering Instructor, Midwest Industrial Management Association, Chicago, Illinois.

One year teaching position in Mechanical Engineering;
Re-evaluation of method, curriculum, and text books;
Co-author of current textbooks and curriculum.

American Citizen.

S. Thomas Lavender

Education University of Waterloo, Waterloo, Ontario
B.Sc., Mechanical Engineering, 1962
University of Wales, University College of Swansea, United Kingdom, M.Sc., Civil Engineering, 1968

Memberships Member, Association of Professional Engineers, Ontario
Member, Institution of Water Engineers, United Kingdom

Experience

1968 to date

Acres. 1971 Senior Engineer, Hydraulic, H.G. Acres Limited.
Participation in the following projects:

- Feasibility Study, Long Spruce Project, Manitoba Hydro;
- Dunkirk Steam Station Yard Drainage, Niagara Mohawk Power Corporation;
- Thermal-Hydraulic Model Study, Niagara Mohawk Power Corporation;
- Howell-Bunger Valve Model Study, Rochester Gas and Electric Corporation;
- Study of Lake Erie Ice Boom, Water Surface Survey, Canada.

1970 Senior Engineer, Hydraulic, Acres International Limited, Buenos Aires, Argentina.

Hydrological and hydraulic responsibility for the multipurpose 1,300-Mw Salto Grande Hydro-electric Project, Uruguay River, Argentina-Uruguay, including:

- assessment of water resources;
- probable maximum flood studies (240,000-sq km basin);
- hydraulic design of structures and diversion works;
- hydraulic model study of proposed powerhouse sluice scheme.

1968 Senior Engineer, Hydraulic, H.G. Acres Limited. Co-ordination of hydraulic studies for the Alto Anchicaya Project, Colombia, including:

- hydrological studies including probable maximum flood study;
- analysis of hydraulic surge in power tunnel and surge tank;
- hydraulic design of permanent structures and diversion works;
- reservoir sedimentation study;
- hydraulic model study of tapered chute spillway.

1966-1968

Athlone Fellow, United Kingdom.

1967 Visitor with Water Resources Board, Reading, Berkshire.
Participation in various studies, including:

- stream gauging, river flow record reliability and reliable yields;
- storage (requirements) for direct supply, river regulating and off-channel reservoirs;
- future water demands;
- water dispersment priorities during periods of extreme drought;
- analogue models of ground water supplies;
- economics of water resource development in the Trent River Basin (digital computer model);

1966 Postgraduate student, University College of Swansea. Advanced studies in hydrology, hydraulics, numerical methods and computer programming, experimental techniques in fluid mechanics, and experimental stress analysis.

Theoretical analyses and experimental investigation of the drawdown caused by flip-bucket jets in tailraces.

Assistance with construction and testing of a three-dimensional model of Aberfan Tip No. 7 and examination of similitude criteria for interpretation of model results for the inquiry into the cause of the slope failure of the coal mining refuse constituting Tip No. 7 at Aberfan, Wales.

1962-1966

Engineer, Hydraulic, H.G. Acres Limited. Hydraulic and engineering investigations and studies including:

- Los Esclavos Development, Guatemala;
- Northumberland Strait Crossing, New Brunswick-Prince Edward Island;
- Woodstock Conservation dam, Woodstock, Ontario;
- Churchill Falls Development, Labrador;
- Mactaquac Development, New Brunswick;
- Manicouagan 1 Development, Quebec;
- Manicouagan 2 Development, Quebec.

Project Engineer on the following projects:

- Measurement of Ice Forces on Lightpiers, Department of Transport, Canada;
- Saint John River Ice Study, New Brunswick Electric Power Commission;
- Chesterville Weir Backwater Effects, Nestle Canada Limited.

Bryan G. Long

Education University of London, London, England, B.Sc. Engineering, 1946
Imperial College of Science and Technology, University of London, London, England, D.I.C. Thermal Power and Process Engineering, 1965, M.Sc. Thermal Power Engineering, 1966
University of Toronto, Toronto, Ontario, M.B.A. Business Administration, 1970

Memberships Member, Association of Professional Engineers, Ontario
Member, Engineering Institute of Canada
Member, Institute of Combustion and Fuel Technology of Canada

Experience

1966 to date

Acres. 1968 Executive Engineer, Thermal, H.G. Acres Limited

1966 Senior Project Engineer. Direction and supervision of engineering for:

- layout designs and equipment specifications for a 178-Mw thermal-electric power station, INCO;
- gas-fired system complete with controls including thermocouples and datalogger for warming up and drying out refractory materials, Aluminium Laboratories Limited;
- extensions to central steam plants, installation of a regional 10,000-ton chiller, extensions of services distribution systems, and design of a primary heating supply system (high temperature water), McMaster, Hamilton and Queen's universities, Ontario, and Prince of Wales College, Prince Edward Island;
- pilot plant testing for water systems and hot and cold tower trays, and design of off-site water systems for a heavy water plant, Canadian General Electric Company Limited.

Development of a computer program for the analysis of steam turbine heat balances.

1963-1964

Special Project Engineer and Head of the Industrial Division, Gibb, Underwood & McLelland, Toronto, Ontario. Investigations, studies and preparation of reports and proposals for industrial, power and transportation projects. Direction of the mechanical engineering for all projects.

1961-1963

Chief Mechanical Engineer, Marshall, Macklin, Monaghan Limited, Toronto, Ontario. Supervision of mechanical and electrical engineering design sections, and of preparation of reports and specifications for special projects.

1956-1961

Chief Mechanical Engineer, James F. MacLaren Limited, Toronto, Ontario. Direction and co-ordination of electrical, mechanical and structural engineering, and supervision of construction for industrial and municipal projects, including sewage treatment and water purification plants, incinerator plants, pumping stations and pipelines, and telemetering and supervisory control systems.

1954-1956

Assistant Manager, Falmouth Docks & Engineering Company Limited, Falmouth, England. Direction of the design and construction of new works for modernizing a ship repair yard and port facility, including a dry dock for 100,000-ton tankers; foundry, machine and maintenance shops; deep-water berths; and operational supervision of all dockyard facilities.

1950-1954

Engineer, Balfour, Beatty & Co. Limited, Engineers and Contractors, London, England. Studies and designs for thermal and hydro-electric power plants. Supervision of the installation, testing and commissioning of all plant and transmission-line equipment for hydro-electric power projects in Nigeria, Kenya and the Sudan.

1946-1950

Engineer, Imperial Chemical Industries Limited, Billingham-on-Tees, England. Preparation of designs and specifications and equipment procurement for new chemical and petrochemical plants to manufacture chlorine, nitric acid, sulphuric acid, nylon and terylene.

Technical Publications

"Cyclic Pressure Variations in an Internal Combustion Engine" M.Sc. Thesis, University of London, 1966.

Education King's College, University of Durham, England, B.A., Land Use Studies, 1963

Memberships Member, Town Planning Institute (United Kingdom)
Member, Community Planning Association of Canada
Member, The Town Planning Institute of Canada (Ontario Chapter)

Experience

1967 to date

Planning Consultant, Hedlin, Menzies & Associates Limited, Toronto Regional Office. Directed a series of five preliminary appraisals of the value of industrial lands and buildings in four Canadian cities for a Canadian manufacturing industry.

Directed a study of the evaluation of visitor use and measurement techniques of National Parks Interpretive Services for the Department of Indian Affairs and Northern Development.

Directed a study of the economic impact of campground investments on Indian Reserves in Ontario.

Directed an economic study of downtown Vancouver examining space utilization by industries and manpower requirements.

Worked as a land-use planner on an interdisciplinary study of an erosion control program for Scarborough Bluffs in Ontario.

Worked on a study of the distribution and projection of land uses in Ontario as part of the Ontario Farm Income Study for the Government of Ontario.

1966-1967

Transportation Planner, Kates Peat Marwick and Company, Toronto. Worked on an evaluation of tourist facilities and recreational opportunities in Northwestern Ontario and in the Maritimes.

Worked on land-use inputs for transportation models for Metropolitan Toronto, and High-Speed Ground Transportation for the Northeast Corridor, U.S.A.; Montreal airport feasibility planning studies; and visitor attendance studies to Expo 1967, Montreal.

1963-1965

Planning Consultant, Shankland Cox and Associates, London, England. Participated in studies of port warehousing facilities (Liverpool); the garment industry; car-parking facility planning; policy making; and acted as consultant on port activities in the Ipswich Region.

The Use of Land Use Models in the Planning Process with Reference to the Metropolitan Toronto Planning Board Official Plan.

Economics of Urban Transportation for the First Conference on Urban Transportation sponsored by the Canadian Federation of Mayors and Municipalities February 1969, as well as papers on land uses in Ontario. (Co-author)

Member of an interdisciplinary team submission for an International Town Planning Conference *Urban Expansion, Vienna South*, November 1970.

Davind S. MacKay

1953-1962

Education University of London, London, England B.Sc., Engineering, 1953

Memberships Member, Association of Professional Engineers of the Province of Ontario
Member, Institution of Civil Engineers, United Kingdom

Resident Engineer, Engineering Assistant, British Railways, London, England. Assigned during 1958-1961 to the Nigerian Railway Corporation, Lagos, Nigeria, to consult on planning, direct contract negotiations, and supervise construction and maintenance of various railway structures and 300 miles of trackage.

Supervision of construction for major rehabilitation of railway stations.

Preparation of contract documents for the construction of trackage, retaining walls, reinforced concrete railway structures, and drainage schemes.

Experience

1965 to date

Senior Engineer, Civil, H.G. Acres Limited. Responsible for a study of the technical and economic aspects of a deep sanitary sewerage interceptor system for the southern area of Niagara Falls, Ontario, and supervision of the preparation of drawings and specifications for two pumping stations and an inter-connecting force main (10,000 feet long) for the system.

Responsible for the surveys and preparation of designs, drawings and specifications for a two-lane, gravel-surfaced road 14 miles long, The International Nickel Company of Canada, Limited, Shebandowan Lake, Ontario.

Responsible for the execution of a study to determine the feasibility of dewatering the site of a proposed open-pit mine and removing overburden by dredging methods, Shebandowan Lake Project, The International Nickel Company of Canada, Limited.

Responsible for the preparation of preliminary designs and capital cost estimates for various arrangements of tunnels and bridges, and for cost analyses of the associated railway networks for the proposed consolidation of a number of railway crossings of the Welland Canal, Niagara Peninsula, Ontario.

Responsible for the preparation of the contract drawings and specifications for the construction of various transportation projects, including:

- Highway crossing structures and approaches, Ontario Hydro Canal, McLeod Road and Thorold Stone Road, Niagara Falls, Ontario
- Reconstruction of Lundy's Lane between Main Street and Drummond Hill, Niagara Falls, Ontario
- West approach to the Welland Canal highway tunnel, Thorold, Ontario

1962-1965

Assistant Engineer, Sir Owen Williams and Partners, Consulting Engineers, London, England. Responsible for the preparation of designs, cost estimates, specifications and contract drawings for the M 6 London-Lancashire Motorway (approximately 100 miles), and its intersections and access roads.

Education Queen's University, Belfast, Northern Ireland, B.Sc. (Honours), Electrical Engineering, 1948

Memberships Member, The Association of Professional Engineers of the Province of British Columbia
Member, Association of Professional Engineers of the Province of Ontario
Senior Member, Institute of Electrical and Electronics Engineers
Fellow Member, Institution of Electrical Engineers, United Kingdom

Experience

1968 to date

Executive Engineer, Electrical, The Acres Group. Responsible for the administration in Canada of the preparation of the technical sections of a plan for the development of international airport facilities in Brazil.

1966-1968

Specialist Consultant, Electric Power Systems, H.G. Acres & Company Limited. Digital computer analysis of the power and energy available from the complete development of the Churchill River, Labrador, Newfoundland.

1965-1966

Senior Electrical Engineer, H.G. Acres & Company Limited. Design and cost estimates for an underground electric power distribution system in the City of Saint John, New Brunswick.

Analysis of operation of the Maritime Power Pool to determine the downstream effects that would result from the construction and operation of the Dickey Power Project on the U.S. reach of the Saint John River.

Preliminary design of a high-voltage substation, and assistance with manufacturing and power supply contract negotiations for an iron ore pelletizing plant in Western Ontario.

Preparation of the electrical aspects of a proposal for a 50,000-kw arc furnace.

Review of the investment program of a major electric power utility in Mexico.

1962-1965

Senior Engineer, British Columbia Hydro and Power Authority, Vancouver, British Columbia. Responsible for system planning and development for those sections of the Authority's system that were operated by the British Columbia Power Commission prior to the formation of the Authority.

Engineer, British Columbia Power Commission, Victoria, British Columbia. Electric system planning engineer (1959-1962) and transmission planning engineer (1956-1959) responsible for the economic analysis of alternative power system arrangements (consolidated hydro/thermal versus isolated systems); the selection of transmission system arrangements, routes, voltage levels, and equipment, and the overall feasibility and reliability of the Commission's systems.

1954-1956

Superintendent of Electric Distribution, Cia. de Tranvias, Luz y Fuerza Motriz de Monterrey (Monterrey Railway, Light and Power Company), Mexico.

Responsible for the maintenance, extension and operation, including public relations, of the 13.2-4.16-kv electric power distribution system of the City of Monterrey, Mexico.

1952-1954

Engineer, Montreal Engineering Company Limited. Designs for electric power transmission and distribution systems.

1948-1952

Junior Engineer, National Coal Board, United Kingdom. Designs for electric power distribution and utilization systems for coal mines.

Education Royal Technical College, Glasgow, Scotland,
Diploma Civil Engineering, 1950

Memberships Member, Association of Professional Engineers,
Ontario
Member, Institution of Civil Engineers, U.K.

Experience

1957 to date

Acres. 1966 Executive Engineer, H.G. Acres Limited. Responsible for administration and technical aspects of engineering for hydro-electric conservation and river regulation works, industrial development, municipal and transportation projects.

1961 Project Engineer. Direction of engineering for investigations, studies, designs, estimates, schedules, drawings and specifications for projects, including:

- McCormick Dam Project No. 3, Quebec, 160,000 hp;
- New Filling System, Lock 6, Welland Canal, The St. Lawrence Seaway, Ontario;
- Traffic Studies — Cities of Niagara Falls and Welland, Ontario.

1957 Engineer. Project studies and contract administration for civil works, and equipment installations for Chute-des-Passes Hydro-Electric Development, 1,000,000 hp, and related Manouan Diversion Channel, Quebec.

Construction supervision of civil works, and installation of hydraulic and mechanical equipment at Kelsey Hydro-Electric Development, Manitoba, 210,000 hp.

1956-1957

Engineer, A.D. Margison & Associates, Consulting Engineers, Toronto, Ontario. Design and preparation of drawings and contract documents for highway relocation projects.

1954-1956

Engineer, Stewarts & Lloyds Limited, Steel and Tube Manufacturers, Corby, U.K. Preparation of layouts and cost estimates for civil works for open-hearth and blast furnaces, sintering plants, and ore-handling facilities, New Development Section, Corby.

Resident Engineer for construction of a 60-ton open-hearth furnace and ancillary works, including gas producers, casting facilities and a laboratory building, Clydesdale Works, Glasgow, Scotland.

Resident Engineer, A.P.I. Cotterell & Son, Consulting Engineers, London, England. Construction supervision of a large municipal road and sewer project, Birkenhead, Cheshire, England.

1950-1951

Assistant Engineer, Crouch & Hogg, Consulting Engineers, Glasgow, Scotland. Designs for various water supply projects, and for a storm drainage system, City of Dunfermline, Scotland.

Bernard Meredith

Education Victoria University, Manchester, England.
Diploma in Architecture and Certificate in
Town Planning, 1951

Memberships Member, Ontario Association of Architects
Member, Royal Architectural Institute of
Canada
Associate Member, Royal Institute of British
Architects

Experience

1965 to date

Head, Departments of Architecture and Graphic Services, the
Acres group. Responsible for the administration and technical
direction of the departments, which have seven associate
architects and designers and a supporting staff of more
than 40. Responsible as Executive Architect for various special
projects.

1960-1965

Assistant Head, Department of Architecture, H.G. Acres &
Company Limited. Assistant responsibilities for the architec-
tural phases of the firm's projects.

Typical projects:

Municipal

The City Hall; Centennial Square; "Dorchester Manor" Home
for the Aged; McLeod Road Pumping Station; Stamford-
Niagara Pollution Control Plant; and The Salvation Army
Citadel, Niagara Falls, Ontario;

R.L. Clark Water Purification Plant, Toronto, Ontario;

An arena and a covered swimming pool, Labrador City,
Labrador, Newfoundland;

Preliminary design for a \$26,000,000 sport and recreation
centre (OMNIPLEX), Edmonton, Alberta.

Educational

Lord Elgin Special Vocational School and its 1970 addition,
Niagara Falls, Ontario;

Additions to Cherrywood Acres and James Morden Primary
Schools, Niagara Falls, Ontario;

Alterations to Clark School, Welland, Ontario;

Site selection and schematics for the College of Art, Halifax,
Nova Scotia;

Preliminary design for Guelph University Central Services
Building, Guelph, Ontario.

Commercial

Head office building, Quebec North Shore Paper Company,
Baie Comeau, Quebec;

Office building, E.B. Eddy Forest Products Limited, Espanola,
Ontario;

John Deere Limited, Welland, Ontario;

Carborundum Company, Jacksboro, Tennessee;

Alterations to two office buildings, Imperial Life Assurance
Company, Toronto, Ontario;

Preliminary designs for new offices and plant, Dorr, Oliver,
Long, Orillia, Ontario;

Bank buildings, Imperial Bank of Commerce, Guelph, St.
Catharines, Caledonia and Simcoe, Ontario;

The Park Motor Hotel, Niagara Falls, Ontario;

A laboratory, Atomic Energy of Canada, Chalk River, Ontario;

Systems designed low-cost housing for Transcan Custom
Homes Limited, Kenora, Ontario.

Planning

Urban Renewal Report and Civic Centre Master Plan, City of
Niagara Falls, Ontario;

Major Recreation Study, Niagarama, Niagara Falls, Ontario;

Huntington Subdivision Master Plan, Saint John, New
Brunswick;

Rockwood Park Master Plan, Saint John, New Brunswick;

Proposal for shopping mall and high-rise apartments,
Courtenay Place Redevelopment Area No. 2, Saint John, New
Brunswick;

Urban Renewal Plan, Dartmouth, Nova Scotia;

Feasibility report for D'Hibou Ski Centre, Stoneham, Quebec;

Town and recreation site, Mactaquac, New Brunswick;

Construction campsites at Chute-des-Passes, Quebec; Kelsey
and Grand Rapids, Manitoba; and Lower Notch, Ontario
(hydro-electric power stations).

Architectural/Engineering

Central utilities buildings: York, McMaster, Brock, Queen's,
Moncton and Toronto Universities;

Hydroelectric power stations: Churchill Falls, Labrador;
Manicouagan 2, Quebec; Mactaquac, New Brunswick; Sirikit,
Thailand; Nam Ngum, Laos; Los Esclavos, Guatemala; and
Alto Anchicaya, Colombia;

Welland Canal crossing tunnels and ancillary buildings, Thorold and Welland, Ontario;

Preliminary design for the proposed Northumberland Strait Crossing;

Preliminary design for the NATO Satcom Tracking Station, Ottawa, Ontario;

Rehabilitation of Peterborough and Kirkfield Lift Locks, Trent Canal, Ontario.

Industrial

Two float glass plants, Pilkington Brothers (Canada) Limited, Scarborough, Ontario;

Process plants: Carborundum Company, Jacksboro, Tennessee; AMAX, Parkersburg, West Virginia; and Union Carbide, Marietta, Ohio, and Bishop, California;

Kraft paper mill, Quebec North Shore Paper Company, Baie Comeau, Quebec;

Small arms and ski plants: Olin Corporation, Cobourg, Ontario and Middletown, Connecticut;

Plant additions and alterations: Catelli-Habitant, Montreal, Quebec; John Deere Limited, Welland, Ontario; Canada Hair Cloth Company, St. Catharines, Ontario; St. Lawrence Starch Company, Port Credit, Ontario; Norton Company, Chippawa, Ontario; and Alcan, Kirkvine, Jamaica;

A research building for The International Nickel Company of Canada Limited, Port Colborne, Ontario;

Building face lift, prize winning, Olin Corporation, Niagara Falls, New York;

The Royal Canadian Mint, Ottawa, Ontario.

Interior, Exhibit and Industrial Design and Commercial Art Interiors for: R.L. Clark Water Purification Plant, Toronto, Ontario; Sir Izaak Killam Hospital, Halifax, Nova Scotia; E.B. Eddy Company offices, Espanola, Ontario; Park Motor Hotel, Niagara Falls, Ontario; Transcan Custom Homes, Kenora, Ontario and Montreal, Quebec; and various hydroelectric and industrial plants;

Exhibit designs for subtheme exhibit "Resources for Man" Expo '67, Montreal, Quebec;

Scale working and design models for exhibitions and miscellaneous presentations;

Graphic and commercial art work for government departments, and industrial and commercial companies.

1957-1959

Head, Architectural Section of Technical Division, H.G. Acres & Company Limited. Responsible for the preparation of architectural designs, working drawings and specifications for industrial, hydroelectric and thermal power plants. Typical projects:

— Bersimis No. 2, Beauharnois No. 3 and Chute-des-Passes hydroelectric developments, Quebec;

— Warsak and Shadiwal hydroelectric developments, West Pakistan.

1955-1957

Assistant to Borough Architect, Widness, Lancashire, England. Responsible for the design and supervision of large-scale housing developments, a shopping centre and two schools. Preliminary design for a technical institute and an indoor swimming pool complex. Town Planning Officer in charge of facade control.

1951-1955

Senior Assistant to Company Architect, Dunlop Rubber Company Limited, United Kingdom. Responsible for the architectural designs and working drawings for various offices, sales depots and industrial plants in England, Germany, India, South Africa and Brazil. Redevelopment and town planning proposals for sections of Manchester and Stoke-on-Trent, England.

Technical Papers

Co-ordinator/Lecturer, "Urban Studies 290," Brock University, St. Catharines, Ontario, 1969-1970.

"Poles Apart? Utility and Beauty" (Transmission Line Aesthetics), Canadian Electrical Association, Annual Convention, Montreal, Quebec, 1969.

Awards 1961

Second prize winner (with J.A. Szarvas and A.G. Zimmerman) in a Stainless Steel Bank Competition sponsored by the Stainless Steel Design Award Committee for Atlas Steels Limited, The International Nickel Company of Canada, Limited, and Union Carbide Canada Limited.

Born 1947, Lethbridge, Alberta

Education University of Toronto 1966-1970 Bachelor of Landscape Architecture University of Toronto 1971 Extension Student Water Resource Management

Memberships Associate Canadian Society of Landscape Architects Candidate Ontario Association of Landscape Architects

Prior to joining the firm Mr. Olsen had worked with the Western Region of the National and Historic Parks preparing detailed planting design and site supervision for the reconstruction of the Radium Hot Springs in Kootenay National Park.

At this time he was also responsible for a detailed plant inventory of the Riel House and Lower Fort Gary in Winnipeg.

Mr. Olsen is a Project Landscape Architect of Project Planning Associates Limited responsible for detailed inventory, site analysis, detailed design and on site construction supervision.

Experience

1970 to date

As a project landscape Architect Mr. Olsen has been involved in a variety of site inventories, research projects and detailed design.

For the Ontario Hydro Electric Commission he has prepared detailed inventories and ecological analysis for the Nanticoke, Bruce and Pickering Generating Stations. This has led to the development of a 60 acre park and wild life sanctuary on an area that was once a construction spoil and storage area at the Pickering Generating Station.

His interest and knowledge of horticulture has been applied to the ecological and resource planning background in the preparation of working drawings and detailed site supervision for the planting of the Welland Canal relocation and restoration.

Mr. Olsen has recently completed the inventory and site analysis of the Pickering — Ajax sector of the Metro Waterfront Plan and Master Plans for the Metropolitan Toronto and Region Conservation Authority.

Studies and research of street furniture and street lighting have led him into detailed studies and recommendations for the integration of street lighting and signage for the New Town of Meadowvale.

Mr. Olsen has undertaken numerous responsibilities concerned with student groups and has spent the past year as a Don of Residence for the University of Toronto.

Christo J. Prinsloo

Born 1937, South Africa

Education B.Sc. cum laude, in Civil Engineering, Howard College, University of Natal, Durban, South Africa, 1958
Quantity Surveying, Westminster Technical College, London, England, 1961
Computer Programming of Structural Engineering Calculations, University of London, King's College, London, England, 1962.

Memberships Member, Association of Professional Engineers of Ontario
Member, Engineering Institute of Canada.

Experience

1965 to date

Mr. Prinsloo joined Project Planning Associates Limited early in 1965 as an executive engineer and is now a principal of the firm and Assistant General Manager of the international subsidiary of the firm. The following is a representative selection of projects on which Mr. Prinsloo carried the major executive responsibility for the project:

1969 to date: Government of Kuwait, Kuwait, Arabia — Project Director — Design and implementation of a small industrial harbour and several pleasure craft marinas.

Government of Kuwait, Kuwait, Arabia — Individual Assignment — Feasibility studies and reports on small industrial harbours and several pleasure craft marinas.

Government of Guyana/International Bank for Reconstruction and Development/ International Development Agency — Individual Assignment — Promotion, pricing, contract negotiations, project organization and staffing, specialist sub-contract negotiation and work scheduling for the multilateral school programme consisting of several secondary schools and a teachers' training college.

Falconbridge Dominica C por A Dominican Republic, Caribbean — Project Director — Master planning, design and implementation of company housing required by the development of a major new nickel mine in the Dominican Republic.

Government of Antigua, West Indies — Project Coordinator — On site data collection for the development of a master plan for the island of Barbuda, including necessary on site pumping tests required for the hydrological study.

Government of Trinidad and Tobago, West Indies — Project Coordinator and Chief Civil Engineer — International airport feasibility and location study for the island of Tobago.

St. Lawrence Seaway Authority, Montreal, Quebec, Canada — Project Director — Earth form design and implementation for relocated Welland Canal. Landscape architectural design and implementation, for the relocated Welland Canal.

University of Guelph, Guelph, Ontario, Canada — Study Director — Site selection study and programme development for Institute of Biomedical Research and Veterinary Field Station.

Study Director — Roads and Parking Study and Recreation Study.

Study Director — Furniture Design, Fabrication and Installation for the Central University Library (McLaughlin Library).

Project Coordinator — All architectural, engineering, landscape architectural and planning design and implementation for approximately \$20 million of work undertaken by the firm at the University of Guelph, including all project accounting and invoicing.

Lambton College of Applied Arts and Technology, Sarnia, Ontario, Canada, Study Director — Site selection for the College and the development of the educational philosophy for the College.

Canadian Corporation for the 1967 World Exhibition, Montreal, Quebec, Canada — Project Coordinator — Landscape architectural design and implementation for all the public areas. Road paving design and implementation, including the control and organization of all contract drawing production, specification writing, quantity surveying, cost estimates, and tender call document preparation. Structural engineering design and implementation (concrete, steel, timber, marine structures).

In his role of international business development for the firm, Mr. Prinsloo has repeatedly travelled to most of the major cities in the world, and has in particular, extensive knowledge of the Middle East, Iran, Britain, Caribbean and South Africa.

1961 to 1965

Mr. Prinsloo was employed by Scott and Wilson, Kirkpatrick and Partners, London, England. The following is a representative selection of projects undertaken by Mr. Prinsloo during this period:

Government of Kuwait, Kuwait, Arabia — Resident Engineer — Central Medical Stores, Construction Value \$3,200,000; Hospital for Chest Diseases, Construction Value \$9,000,000.

Barbican Redevelopment Scheme, R.U. 17 Moorfields, London, England — Head of structural design team — 20 storey office building structural design.

Dungeness Atomic Power Station, England, Structural design engineer, Main Reactor Building.

Mr. Prinsloo was employed by Sir Robert McAlpine & Sons Limited, Wales, United Kingdom, where he worked as a Section Construction Engineer on the Richard Thomas and Baldwin Steel Works carrying out the construction of approximately 48 miles of site roads and the construction of the lime burning plant.

1958-1960

Mr. Prinsloo was employed by Stewarts and Lloyds of S.A. Ltd., Johannesburg, South Africa, initially as a structural design engineer on the development of tubular structures and later as a sub-branch manager of the Ermelo Branch. Thereafter he was promoted to Contract Manager in charge of the Tubular Structures Division.

Mian A. Rashid

Education Punjab University, Lahore, West Pakistan, B.Sc. (Honours), Chemical Technology, 1954, M.Sc. Chemical Technology, 1955
Royal College of Science and Technology, Glasgow, Scotland, Ph.D. Fuel Technology, 1967, Ph.D. Thesis — "Reforming of Natural Gas by Iron Oxides"

Memberships Member, Canadian Society for Chemical Engineering
Associate Member, Institute of Fuel, United Kingdom

Experience

1970 to date

Acres. 1970. Senior Analytical Chemist, H.G. Acres Limited. Supervision of air and water pollution sample analysis including:

- selection of procedures for quantitative and qualitative analysis of gaseous and particulate samples; co-ordination of sampling procedures with analysis requirements; supervision of analytical work by laboratories engaged for special studies.

1969 Chemical Technologist, J.T. Donald and Company Limited, Scarborough, Ontario. Analysis of solid, liquid and gaseous fuels; water and boiler scale analyses for thermal stations; sampling and analysis of water and air pollutants.

1967-1969

Post Doctoral Fellow, University of Western Ontario, London, Ontario. Analysis of sulphur compounds, hydrocarbons and their oxidation products by gas chromatography in a dynamic system.

1963-1967

Ph.D. Candidate, University of Western Ontario, London, Ontario.

1959-1963

Chemical Engineer, West Pakistan Water and Power Development Authority. Supervision of chemical and operational control of water treatment and conditioning units, chlorination plant and hydrogen gas generation plant; analysis of combustion gases and fuels.

1955-1959

Chemist, Pakistan Industrial Development Corporation. Process control of paper and board mills.

Born 1945, Rapid City, South Dakota, U.S.A.

Education University of Nebraska
School of English Language Arts
University of Nuevo Leon, Monterey, Mexico
Bachelor of Arts in Creative Writing and Sociology

Experience

After completing under-graduate work at the University of Nebraska, Mrs. Richards joined the Staff of H.H. Harne Advertising. As senior copywriter and research group leader, her function was to co-ordinate marketing and motivational research programmes for the Firm's clients. Later that year she was engaged on a professional basis as survey co-ordinator for the Democratic Gubernatorial Campaign in Nebraska. Her responsibilities included attitude studies, public relations programming and media management for the campaign period.

American Citizen. Married.

1969 to date

Mrs. Richards is Director of Sociological Programmes in Motivational Research for the Project Group of Companies in Interthink Limited. She works with The Urban and Environmental Planning Staff in developing sociological research programmes to augment Planning Development.

1968 to 1969

After returning from the Orient in early 1968, Mrs. Richards joined the staff of the Rehabilitation Institute in Chicago. While there she developed a psycho/socio programme of social rehabilitation. The title of this work is "Intensive Interaction in Social Re-Orientation". The work was co-authored with Dr. Bernard Levine, Chief Psychologist, Rehabilitation Institute, Chicago, Illinois, and has been used at the Rehabilitation Institute and the Houston Burn Centre. From the initial development of this programme, adaptations have been made and the design expanded to have industrial and planning value. This revised design method is entitled Intensive/Interaction Workshop methods and has been used by numerous companies including, Boeing Aircraft, Kendall Company and The Electric Reduction Company of Canada Limited for the development of marketing strategies and employee programmes.

1965 to 1967

In 1965 Mrs. Richards became internal advertising editor for "Look" magazine. She was responsible for: development of creative concept for Cowles Communication advertising programmes and for development of studies to measure consumer response to publication content and advertising. In late 1965 she was assigned the task of developing the Cowles Advertising Campaign Approach for 1966. Her duties included examination and analysis of existing data related to consumer response on "Look" magazine and "Venture: A Travelers World". In 1967 she requested and received an assignment to "New History Research" a joint publication venture, designed to develop human interest data related to current events. The main thrust of the programme was interviewing U.S. Armed Forces in the Orient on attitudes and experiences. She was based in Tokyo for eight months and traveled extensively through the Pacific Rim. She functioned as both research consultant and foreign correspondent. Material based on this work has been published in "Look" magazine, "Time" and "Life".

1964 to 1965

Brian Riera

Born 1947, England

Education Diploma in Town Planning from the Leeds School of Town Planning, England, 1970
Master of Arts in Systems Engineering from the University of Lancaster, England, 1970.

Experience

Mr. Riera joined Project Planning Associates Limited, Toronto, in the latter part of 1971.

1971

Mr. Riera, on behalf of the International Systems Corporation of Lancaster, was responsible for the design of a monitoring and advisory system for a sub-regional planning unit. The system was designed for the four planning authorities of the Nottinghamshire and Derbyshire sub-region to provide them with continuous advice for planning the sub-region. The design detailed the methodology for monitoring major decisions and development within the office, and for determining and communicating advisory action. The system is the first of its kind in England and represents a significant development in local authority involvement in sub-regional planning.

1969-1970

He was involved in research into computer simulation models for town planning, and examined the incorporation in existing models of direct simulation of behaviour patterns.

1965-1967

He spent two years as a planning trainee with Hertfordshire County Council in England, and gained experience in the range of work in the County's Planning Department.

British subject.

Speaks English.

Education University of Manitoba, Winnipeg, Manitoba, B.Sc., Civil Engineering, 1959
Imperial College of Science and Technology, University of London, London, England, D.I.C., Concrete Structures and Technology, 1962
University of London, London, England, Ph.D., Failure Characteristics of Concrete, 1965
Harvard University, Cambridge, Massachusetts, Special Studies, Environmental Sciences, 1969-1970

Memberships Member, Association of Professional Engineers of the Province of Ontario
Member, Engineering Institute of Canada
Member, American Institute of Aeronautics and Astronautics
Member, American Society of Civil Engineers
Member, American Society for Testing and Materials
Member, American Concrete Institute

Experience

1970 to date

Head, Applied Mechanics Department, Niagara Falls Office, H.G. Acres Limited. Responsible for the formulation, development and use of operations research methodology (linear programming type) for the screening process required in the selection and sizing of reservoirs, power plants and diversion canals for a massive multibasin hydroelectric power development.

Responsible for the development, testing and use of simulation and mathematical type computer programming models for a study of the effects of water quality management on sociologic and economic development, with particular reference to the Saint John River Basin, New Brunswick.

1969-1970

Research Fellow, Harvard Corporation Appointee, Environmental Sciences Department, Division of Engineering and Applied Physics, Harvard University, Cambridge, Massachusetts.

1968-1970

Member, Executive Committee, GE 400 Users Association. Participation in the promotion of liaison among all parties associated with the use of the General Electric 400 series of digital computers.

Head, Applied Mechanics Department, Niagara Falls Office, H.G. Acres Limited. Responsible for the investigation and study of specific engineering and technical problems, particularly where the solutions involve the use of analogues, experimental or computer techniques, or the extensive use of mathematics.

Supervision of the development of mathematical models for continuum mechanics, particularly in the fields of rock and soil mechanics, structural mechanics and dynamics, and ground-water analysis.

Responsible for the development and application of digital computer programs for general engineering purposes.

Participation in the development and use of mathematical modelling techniques for a study of the effects of water quality management on sociologic and economic development with particular reference to the Saint John River Basin, New Brunswick. The work principally involved the interplay between the study group (engineers, economists, sociologists) and the client in the interpretation of the use of the models.

Development of a general computer program for the structural analysis of rigid frames by the stiffness matrix method.

1965-1966

Engineer, H.G. Acres & Company Limited. Supervision of the development of digital computer programs for the routine solution of general civil engineering problems.

Responsible for the co-ordination of the civil engineering for the intake and the access bridges of the Portage Mountain Hydroelectric Development.

Structural engineering designs for Habitat, Expo '67, Montreal, Quebec.

Investigations, using model piles, of the resistance to lateral load of piles in rockfill for the design of the Northumberland Strait Crossing, New Brunswick-Prince Edward Island.

1961-1965

Postgraduate student.

1960-1961

Structural Engineer, Brown and Root Limited, Engineers and Contractors, Calgary, Alberta.

Structural designs for industrial buildings and equipment foundations.

1959

Field Engineer, Haddin, Davis and Brown Company Limited, Calgary, Alberta. Field investigations and construction supervision for municipal works.

Technical Papers

"Finite Element Applications to Singularity Problems" (in preparation).

"In Situ and Induced Stresses at the Churchill Falls Underground Powerhouse" The Second Congress, International Society for Rock Mechanics, Belgrade, Yugoslavia, September 1970 (with R. Benson and T.W. Kierans).

"Stress Analyses of Underground Openings in Rock Using the Finite Element Method" EIC Annual Conference, Halifax, Nova Scotia, May 1968 (with R. Benson and M.V. Thompson).

"The Influence of Testing Machine Characteristics Upon the Cube and Cylinder Strength of Concrete" Cement and Concrete Association, United Kingdom, Magazine of Concrete Research, December 1966.

"Spherical Seating Characteristics" The Engineer, May 1966.

"The Testing Technique Required to Achieve the Correct State of Stress in Concrete Specimens" The Physical Society and Society of Physics, Symposium on The Physics of Testing Concrete, London, England, January 1966.

"Specimen and Testing Machine Characteristics and Their Effect on the Mode of Deformation, Failure and Strength of Materials" Institution of Mechanical Engineers, Symposium on Testing Machine Design, Manchester, England, September 1965.

"The Influence of the Testing Machine on the Compressive Strength of Concrete" Cement and Concrete Association, Symposium on Concrete Quality, London, England, November 1964.

Education University of Delft, Delft, The Netherlands, Master of Engineering, Civil Engineering, 1951

Memberships Member, Corporation of Engineers of Quebec
Member, Engineering Institute of Canada
Member, Royal Institute of Engineers, The Netherlands

Experience

1969 to date

Staff Consultant, Marine Structures, The Acres Group. Responsible for the supervision and co-ordination of various shipyard studies, including:

- Feasibility study of the proposed development of a complete shipyard facility for the construction of tankers up to 300,000 dwt, Hyun Dai Construction Company, Ulsan, South Korea.
- Technical and economic feasibility study of the proposed addition of a dry dock and steel fabricating facilities to an existing shipyard installation to permit the construction of tankers up to 500,000 dwt, Shipyard Split, Split, Yugoslavia.
- Technical feasibility studies of expanding an existing dry dock to accommodate tankers of 500,000 dwt, Saint John Ship building and Dry Dock Company Limited, Saint John, New Brunswick.

Assessment of the capability of all the existing highway bridges (steel, concrete) between the Port of Buenaventura and the Alto Anchicaya Project, Colombia, in preparation for the transportation of an 85-ton electric power transformer unit.

Consulting assistance with the design of an arctic marine terminal for the offshore loading of oil tankers.

Study of the feasibility of constructing, on the north shore of Lake Erie, harbour facilities to handle ore, coal and oil to, and finished product from, a major basic steel plant, Dominion Foundries and Steel Limited, Port Burwell, Ontario.

Review of the proposed design of the caisson foundations for the eleven towers of the Jamuna River crossing section (seven miles) of the East-West Interconnector (electric power transmission), East Pakistan.

Studies of the use of floated-in methods for the construction of the powerhouse and associated control structures for a tidal hydroelectric power development proposed for a specific site on the Bay of Fundy.

1968-1969

Chief Engineer, Northumberland Consultants Limited, Montreal, Quebec. Responsible for the supervision and co-ordination of the engineering for the feasibility studies and design of the proposed Northumberland Strait Crossing, New Brunswick-Prince Edward Island.

1963-1968

Associates, General Engineering Company Limited and Per Hall Associates, Montreal, Quebec. Study and designs of various tunnels of the submerged precast element type including:

- Lafontaine Tunnel, Montreal, Quebec
- Carlton Street Tunnel, Welland, Ontario
- Hong Kong — Kowloon Tunnel, Hong Kong
- First Narrows Crossing (feasibility study only), Vancouver, British Columbia
- Lake Zurich Tunnel (feasibility study only), Switzerland

Design of various highway bridges, Thailand.

Design of water supply intake structures and pumping stations for paper mills and mining developments.

1957-1963

Supervising Engineer, Foundation of Canada Engineering Corporation Limited, Montreal, Quebec. Design or supervision of the design of various projects, including:

- Ocean Wharf Structures
B.A. Oil, Halifax, Nova Scotia
B.A. Oil, Strait of Canso, Nova Scotia
Irving Oil, Courtenay Bay, Saint John, New Brunswick
Bestwall Gypsum, Point Tupper, Nova Scotia
Revelstoke Bridge, British Columbia
Hartland Bridge, New Brunswick
Dosco Coal, North Sydney, Nova Scotia
Texaco Oil, Charlottetown, Prince Edward Island
Oil Tanker, Saint John, New Brunswick
Cargo, Baie Verte, Newfoundland
- Reconstruction of the harbour, St. John's, Newfoundland
- Cofferdams for excavation in rock of a new harbour area, Port Cartier, Quebec
- Marine salvage of the sunken vessel "Federal Express", Montreal, Quebec

1954-1957

Design Engineer, Precompressed Concrete Engineering Corporation Limited, Montreal, Quebec. Engineering design of industrial structures for cement plants and paper mills.

1952-1954

Design Engineer, H. Jasen Limited, Consulting Engineers,
Montreal, Quebec.

Technical Papers

"Ice Pressures Against Isolated Structures" International Association of Hydraulics Research Ice Symposium 1970, Reykjavik, Iceland (with E. Dinkla).

"Precast Floated-in Construction as Applied to Tidal Power Developments" International Conference on the Utilization of Tidal Power, Halifax, Nova Scotia, 1970 (with P.R. Tozer).

"Concrete Arch Bridge at Hartland, New Brunswick" Engineering Journal, 1961 (with E. van Walsum).

Theodore R. Smith

Born	1921, Toronto, Canada
Education	University of Toronto, Civil Engineering, 1951
Memberships	Member, Association of Professional Engineers of Ontario

Mr. Smith is a founding partner of Project Planning Associates Limited and Project Planning Associates (International) Limited and has been active in municipal, industrial and transportation engineering since 1952. He has gained extensive experience in planning and detailed engineering design of municipal services, roads, industrial parks and subdivisions. His work has primarily taken place in Canada, the West Indies, Australia, Fiji and U.S.A. He has obtained a thorough and comprehensive understanding of the environmental and physical factors related to both industrial and community design. His prime experience is in the initiation and implementation management of the design programmes. Other experience includes pre-engineering feasibility studies, land capability and soils investigations, proforma statements for residential and industrial development. His experience has also embraced specification writing for engineering projects and the subsequent supervision of the projects.

Experience

1956 to date

Mr. Smith, as Chief Engineer, was responsible for the infrastructural design and overall supervision of its implementation of the Toronto Islands Park for Metropolitan Toronto. Included in this project were municipal service installations, an extensive irrigation system, ferry terminal docks and a considerable dredging programme.

Mr. Smith in 1960 moved to Halifax, Nova Scotia, to establish an office to handle projects in the Maritimes. In charge of this office, he was for a number of years engaged in providing the municipal and transportation design input into planning studies. Among these, the most interesting is Clayton Park, in whose ongoing development he is still involved. Following successful master planning, Mr. Smith has taken Clayton Park, a large residential subdivision overlooking Bedford Basin on the northern edge of Halifax, through the necessary detailed planning stages and approvals, and was responsible for the design of major services networks and the design and detailing of roads. He also has been largely responsible for environmental and visual control of development, by gaining widespread builder acceptance to preservation of existing vegetation, natural rock outcrops, building colour co-ordination and other design and construction constraints.

Overseas, Mr. Smith has during these years been actively engaged in fusing municipal and road engineering skills, and

land capability study experience in numerous projects. Among these was an extensive residential addition to the town of Bonao in the Dominican Republic for Falconbridge Dominicana C por A, in which will be housed the staff for their new mine complex. This project also required considerable site reconnaissance and negotiations with the local authorities.

Mr. Smith also was responsible for the land capability surveys of the Deuba Properties in Fiji now being developed by Pacific Hotels and Developments Limited. On this project, he was also in charge of the design of municipal services and roads layout, and for design of the dredging of the lagoon system.

1955-1956

Guildwood Developments Limited, Scarborough, Ontario, Chief Engineer.

1952-1955

Don Mills Developments Limited, Project Engineer, Design, layout and supervision of municipal services. Chief Design Engineer. Preliminary engineering budget estimates, detailed estimates and budget forecasts, municipal services planning and co-ordination, design and cost studies for industrial and commercial development services, economic analysis of subdivision planning.

1951-1952

Cartier-McNamara, Mannix, Morrison-Knudsen, Resident Engineer.

Canadian citizen, married with three children.

Speaks English.

Michael B. Stone

Education Southall Technical College, England, Ordinary National Certificate in Mechanical Engineering, 1960, Ordinary National Certificate in Electrical Engineering, 1960, Higher National Diploma in Electrical Engineering, 1963, Ministry of Aviation Student Apprenticeship, 1958-1963
National College for Heating, Ventilating, Refrigeration and Fan Engineering, England, College Diploma in Air Conditioning and Automatic Controls, 1965

Memberships Member, Association of Professional Engineers of Ontario
Member, Engineering Institute of Canada
Associate Member, American Society of Heating, Refrigerating and Air-conditioning Engineers
Member, Institute of Heating and Ventilating Engineers (U.K.)
Graduate, Institute of Electronic and Radio Engineers (U.K.)

Experience

1967 to date

Mechanical Engineer, H.G. Acres Limited, Toronto. Responsible for mechanical drafting and engineering personnel on projects for McMaster University, York University and Shell Oil Canada Limited. Design and layout of food processing plants for vegetables and pet foods. Preparation of cost estimates and technical proposals for food plants. Design and layout, including specification writing for underground tunnel distribution services systems for McMaster University and York University. Design and Calculations for chimney stacks and breeching systems for Canadian Armed Forces CFB Shearwater and Shell Oil Limited, Sarnia Refinery.

Site engineer responsible for supervision of general contracts for York University campus, Toronto, including construction of underground tunnels, installation of steam generation and water chilling equipment in Central Utilities Building, installation of tunnel distribution services and mechanical equipment rooms, installation of 27.6 KV main campus feeder system including distribution tunnel cables and main substation.

Responsible for supervision of general contracts at Prince of Wales College, P.E.I., including underground H.T.H.W. distribution system, renovation of existing building heating, air conditioning, ventilation and plumbing/drainage systems.

Preparation of report studies of campus distribution services for York University (1986) and McMaster University including projected installation program for future steam and chilled water mains.

Report and publications written for Acres group in fields of air pollution, water pollution and soil pollution.

Preparation of preliminary layouts for various projects, including: relocation of distribution services for new Student Union Centre, University of Toronto; fuel oil and gas services to new boilers at University of Toronto; fire protection services to new cooling towers at York University; new heating system for Guelph University; mechanical installation for Prince of Wales College.

Freelance Designer, Ministry of Public Buildings and Works, England.

Design and detail of low velocity air conditioning systems for British Forces Base at Sharjah, Persia Gulf.

Freelance Designer, H.J. Cash & Company, England. Design and detail of H.T.H.W. Central Utilities Plant (60×10^6 Btu/hr) for Southward Council.

Supervision of final sizing of distribution mains, including balancing and proportioning services to high rise apartment blocks.

Co-ordination of design work with council architects and consultants during preparation of installation drawings.

1966-1967

Freelance Designer, Minnesoata Mining and Manufacturing Company, England.

Design and detail of L.P.H.W. and steam heating installation ($40,000 \text{ lb/hr}$) to warehouse and office block. Generally controlled mechanical design program in conjunction with civil and electrical departments.

1963-1966

Design Engineer, Ashvale Engineering company Limited, England.

Responsible for designing and specifying L.P.H.W. and steam heating installations up to 30×10^6 Btu/hr and supervision of preparation of detail installation drawings.

Responsible for supervision of company labour crews during contract period, including work supervision. Client liaison included as part of these responsibilities.

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I.J. Thomas

Education University of Manitoba, Winnipeg, Manitoba,
B.Sc., Civil Engineering, 1963
West Virginia University, West Virginia, M.Sc.,
Traffic and Transportation, 1970

Memberships Member, Association of Professional Engineers
of the Province of Ontario
Associate Member, American Society of Civil
Engineers
Junior Member, Institute of Traffic Engineers
Supporting Member, Highway Research Board

Experience

1971 to date

Senior Engineer, H.G. Acres, Limited.

1970-1971

Assistant Master, Civil Technology, Centennial College of Applied Arts and Technology, Toronto. Responsible for the instruction and guidance of Civil Technology students in Highway Design, Traffic, and related subjects such as Soils, Concrete, Sewers and Water Main Design.

1969-1970

Design Engineer, Foundation Engineering Corporation Limited (FENCO) Toronto. Responsible for the planning of transportation facilities including airports and the study of their interactions with urban and regional development. Projects include:

- Puerto Rico Harbour Crossing, Puerto Rico;
- Salvador Airport Plan, Salvador, Brazil, South America.

1968-1969

Graduate Assistant, West Virginia University, U.S.A. Studying graduate program in Traffic and Transportation Engineering.

1965-1968

Engineer, Foundation Engineering Corporation Limited (FENCO) Toronto. Responsible for the design of all phases of urban expressways and complex interchanges including geometric design grading, drainage, utilities, construction staging and detouring. Major projects include:

- Highway 401 — Dixon Road Interchange;
- Highway 401 — Highway 27 Interchange

1963-1965

Civil Engineer, City of Port Arthur. Responsible for the design of sewers, (sanitary and storm), watermains, roadways, the preparation of contract documents and summer field supervision of annual construction program.

Ronald L. Thomson

Born 1936, Toronto, Ontario, Canada

Education B.Sc., Civil Engineering — specialized in port design and coastal engineering, University of Toronto, 1960.

Memberships Member, Engineering Institute of Canada
Member, Association of Professional Engineers of Ontario.

Mr. Thomson is Vice President of Project Planning Associates (International) Limited and Executive Engineer of Project Planning Associates Limited.

Mr. Thomson has been active in maritime and coastal engineering since 1960. Such work has included port and harbour planning, economic and feasibility studies and river and coastal evaluations with respect to water transportation and hydraulic characteristics. His experience also includes marketing and management of interdisciplinary and multi-national professional services and contracts.

He is responsible for the activities of the international company and is also involved in the marketing, managing and design aspects of various domestic projects. His work has primarily taken place in North America, the Caribbean, the Pacific, the Middle East, Asia, Europe and East Africa. Specific countries of experience include Monaco, France, England, Kuwait, Saudi Arabia, Egypt, Qatar, Lebanon, Somalia, Kenya, Tanzania, Malagasy, India, Pakistan, Fiji, Australia, Indonesia, St. Lucia, Trinidad, Barbados, Antigua, and the Bahamas.

He is directly responsible for CPM/Pert programming of projects.

Because of his management capabilities, understanding of interdisciplinary and multi-national teams and projects and knowledge of land development and financing, he has been Project Director and Administrator for many large projects undertaken by this company. In this position his duties have required him to liaise with clients, committees, governmental officials and departments, other professional and technical firms, financiers, and international development organizations and agencies.

Experience

1964 to date

In addition to management control of the International Company, in Mr. Thomson's capacity he has provided the maritime design input for the Kuwait Waterfront Development Scheme including detailed design and shore protections and revetments, cost analyses, functional design of ports and establishing computerized dredging and filling programs.

He was a team member responsible for the port evaluation and planning aspects of the transportation study for the Republic of Somalia.

Other work has included detail design work of marine structures in various communities within Canada and participating on interdisciplinary teams with respect to the planning and functional design aspects of maritime components. Such work has included projects in the Bahamas, Canada, U.S.A., Tanzania, Monaco and Fiji.

Mr. Thomson is responsible for economic and financial statements and analysis of domestic and international land development projects.

1960-1964

Project Engineer, Toronto Harbour Commissioners; responsible directly to the Chief Engineer for planning, design and economic evaluation of port expansion with considerable emphasis being given to the establishment of legislation and policy requirements allowing such expansion to be implemented.

He was also responsible for detail design of cargo handling facilities and terminal and wharf facility designs.

Canadian citizen; married with two children.

Speaks English.

Education University of Toronto, Toronto, Ontario
B.A.Sc. Civil Engineering, 1949
University of California, Berkeley, California
M.E. Traffic and Transportation, 1958
University of Toronto, Toronto, Ontario
Certificate, Public Administration, 1964
Massachusetts Institute of Technology,
Cambridge, Massachusetts
C.E. Transportation and Community
Planning, 1971

Professional Association of Professional Engineers, Ontario
— Member

Associations Institute of Traffic Engineers — Member
Canadian Transportation Research Forum —
Member
Town Planning Institute of Canada —
Provisional Member

Experience

1970 to date

Staff Consultant, Transportation, H. G. Acres Limited

Service evaluation and impact analysis of freeway alternatives
in Welland, Ontario.

Overall review and recommendations of transit needs and
operations in Guelph and Oakville, Ontario.

Forecast of ridership and revenue from proposed monorail
facility in Niagara Falls, Ontario.

1969-1970

Research Assistant, Urban Systems Laboratory, Massachusetts
Institute of Technology, Cambridge, Massachusetts

Preparation of an experimental design for Dial-a-Bus transit
development projects.

Participation in "Transportation and Community Values", an
interactive highway planning and implementation project of
the National Co-operative Highway Research Program.

1967-1969

Manager, Planning and Research, Foundation of Canada
Engineering Corporation Limited, Toronto, Ontario

Responsible for proposals and reports on several regional
development and administrative studies.

Regional Director, First National Urban Transportation
Conference, Toronto, Ontario, January 1969.

Study Director Metropolitan Toronto and Region Transportation Study, Toronto, Ontario

Direction of land use/transportation studies of the
3,200-square mile Toronto region, including a three-mode trip
prediction model; land use/economic forecast for the years
1980 and 2000; commuter/rail demonstration project (GO
train); and recommendations on planning and administrative
policies.

1953-1963

Department of Highways, Government of Ontario, Toronto,
Ontario

1962 Program Engineer

Responsible for Ontario highways inventory; 5-year
development program and schedule; annual capital program;
budgeting records; and research and reports on highway
financing policies.

1954 Head, Statistics and Economics Section

Supervision of road and street requirements studies; highway
inventory and classification studies; highway planning studies
for cities and metropolitan regions; and economic studies of
highway routes and projects.

1953 Traffic Engineer

Participated in provincial traffic-counting surveys,
origin-destination surveys and intersection analysis.

1952-1953

Lecturer/Demonstrator, University of Toronto, Toronto,
Ontario

1951-1952

Assistant Engineer, The Hydro-Electric Power Commission of
Ontario, Toronto, Ontario

1949-1951

Assistant Engineer, Canadian-Brazilian Services Limited,
Toronto, Ontario

Technical Publications

Highway Impact Analysis as a Basis for Project Implementation

C.E. Thesis, Massachusetts Institute of Technology, 1970

Highway Decisions and Community Values

World Highway Conference, Montreal, Quebec, October 1970.

Two Phases of Metropolitan Transportation Buffalo
Symposium on Metropolitan Transportation, 1967.

Transportation for the City of Tomorrow MacLean-Hunter
Publishers, 1967.

An Interagency Study of Basic Issues in Transportation
Highway Research Board Conference, 1966.

Gerald Walker

Born	1934, Kettering, England
Education	Nottingham College of Art and Design, Diploma in Town & Country Planning (Distn), 1957 Kungliga Tekniska Hogskolan (Royal Institute of Technology), Stockholm, Sweden, 1958
Academic Attainments	County scholarship to study town and country planning, Nottingham, 1955 Town Planning Institute (U.K.) Silver Medal, 1957 Scholarship from Swedish Institute for Cultural Relations and Swedish Government for post-graduate studies in housing layout and planning for traffic, 1958
Memberships	Associate Member, Town Planning Institute (U.K.) 1958 Member, Town Planning Institute of Canada, 1968.

Mr. Walker has been active in planning since 1952 and has been a qualified planner since 1957. He has attained an all-round experience in regional, city and national planning as head of interdisciplinary consulting teams. His work has primarily taken place in the United Kingdom, Canada, Sweden, Tanzania and the Bahamas. He has travelled extensively in Scandinavia, Europe, the Middle East, East Africa, the Caribbean, North America and Mexico.

During his professional activities he has undertaken academic assignments such as lecturing at the Royal Institute of Technology, Stockholm, 1958; Graduate School of Design, Harvard University, Cambridge, U.S.A., 1958; Columbia University, New York, U.S.A., 1966; University College, University of East Africa, Dar es Salaam, Tanzania, 1967-68; the Association of Architects, Registration Course, Toronto, Canada, 1969-70; and to numerous local, professional and governmental associations and societies in the countries in which he has worked.

Mr. Walker has obtained experience, as a project leader and head planner, in communication and liaison, presentation, and negotiation techniques at various levels of government and private organizations. Such activities have included presentations and liaison with heads of government and their cabinets, news media, United Nations advisers and project directors, Canadian Government High Commissioners, Ambassadors and staff and various government development committees, advisory boards, ministries and crown and state corporations.

Staff training has been an important integral part of the various projects and assignments undertaken by Mr. Walker. Such staff training has included the instruction of government staff in the various professional fields such that the programs and plans developed are understood and implemented and the inclusion of Government staff within the consultants project team.

Experience

1966 to date

Principal Planner for Project Planning Associates (International) Limited and other member companies of the Project Group. In this capacity Mr. Walker has been head planner and/or project director for many of the projects undertaken by this company that require interdisciplinary teams. Mr. Walker has applied his professional experience on these projects with respect to regional, city and urban planning, planning law and administration, as well as traffic evaluation and design. He has also been directly responsible for the programming and liaison of all team members including specialists and sub-consultants. In this capacity he has the responsibility for direct communication with the various Clients.

During the past few years he has been:

Chief Planner on the Urban Renewal Study for South Point Douglas Area, Winnipeg, Manitoba. This team was composed of members of Project Planning and a firm of Winnipeg architects. They worked closely with the City Urban Renewal Director and his staff as well as the Metropolitan Winnipeg Planning Staff and consultants for adjacent areas.

Chief Planner, responsible for day-to-day co-ordination of an interdisciplinary team preparing the Master Plan for a New Town on New Providence Island, Bahamas, on behalf of Mr. E. P. Taylor and the New Providence Development Company. Worked closely with sub-consultants on aspects such as airports, dairy farming, economics, and fisheries.

Head Planner and Manager of the company's site office in Dar es Salaam, Tanzania, for Dar es Salaam National Capital Master Plan project. Led an interdisciplinary team of up to 20 persons; responsible for training African staff loaned for project. Reported to Dar es Salaam Development Committee, with day-to-day liaison with the Director of Planning for Tanzania and the U.N. Physical Planning Adviser. At termination of project, presented Plan formally to President Nyerere and the Tanzanian Cabinet.

Chief Planner for proposed new Malvern Community of 60,000 persons for Ontario Housing Corporation and Central Mortgage and Housing Corporation. Attached to office of Community Development Consultants Limited for six months,

as head of interdisciplinary team which necessitated close liaison with leading Canadian engineering, architectural and sociological consultants.

Project Director of interdisciplinary team including Dr. J.R. Petrie, Consulting Economist, for preparation of Vieux Fort Master Plan for St. Lucia, West Indies, for development of 5,000 acres around Beane Field jet airport. Worked closely with the Premier and Government of St. Lucia during the project and helped to arrange for CBC "Thursday Night" series television documentary, featuring St. Lucia. Liaised with Federal Department of Transport, Canadian International Development Agency and United Nations Physical Planning Adviser, Eastern Caribbean.

Presently Project Director and Head Planner for new Meadowvale community of 75,000 persons for Markborough Properties Limited. In charge of site office with interdisciplinary team providing planning, engineering, landscape and architectural services. Acts as counterpart to Markborough Properties' Project Manager for Meadowvale, Mr. Kenneth C. Comyns, P.Eng.

1964-1966 Hertfordshire County Council, Planning Department, Hertford, U.K.

Planning Officer in charge of traffic planning techniques section and joint traffic team formed in County Planning and Highways Department.

Responsible for the initial organization of the team prior to appointment of Team Head. Responsible for preparation of Interim Traffic Study for Hertford Central Area, using NCR315 computer for analysis and assignment purposes. Worked with other Sections on survey analysis and forecasting for Land Use/Transportation studies for Hertford, Ware Hoddesdon and also Letchworth, Hitchin Baldock. Organized volume counts and assisted in Home Interview survey preparation, staff selection, etc. Provided advice on environmental and traffic aspects of development applications, particularly large residential layouts. Organized traffic generation studies and special studies related to "environmental standards" on shopping street. Appeared as expert witness at a major public enquiry. Advised on revision of County Parking Standards and initiated development of forecasting techniques including mathematical models in Land Use/Transportation Studies. Produced environmental management scheme for Lordship Area, Letchworth Garden City and worked on initial renewal plans for Central Area of Welwyn Garden City. In charge of Section staff including planners, an economist and engineers. Responsible for liaison with other senior County Staff in Development Control, Development Plan and Urban Renewal Groups.

1963-1964 Government of the Bahamas, Public Works Department, Town Planning Division, Nassau, New Providence, Bahamas

Principal Town Planning Assistant, Deputy to the Town Planning Officer.

Preparation of Development Plan for New Providence Island and City of Nassau, including basic surveys and inventory not previously available. Prepared Road Network Plan and Tourist Facility Plan as well as Plan for C.B.D. circulation in Rawson Square/Bay Street area in connection with harbour expansion scheme. In charge of drawing office and training of Bahamian pupils. Carried out subdivision control for New Providence and several Out Islands, including the Exumas. Designed Big Pond low cost housing area layout in Nassau, the first to include the Liljendahl Vacuum System of sewage disposal. Prepared subdivision layouts for Crown Land at Marsh Harbour, on Great Abaco Island.

Advised Ministry of Works on revision of extremely strict Advertisement Regulations, working with a former Attorney-General of the Bahamas. Appeared at Cabinet meetings and assisted in advising Premier on planning matters. Introduced planning controls and legislation to Out Island Commissioners. General development control duties for the Town Planning Committee.

Member of Panel of Judges of Architectural Competition in 1963 for new Cabinet Building in Nassau.

1961-1963 Eglers Stadsplanebyrå AB, Architectural and Planning Consultants, Stockholm, Sweden.

Community Planner, primarily assistant to Senior Partner, Erik-Olof Holmberg, Arkitekt SAR, but also assisting Senior Partners Harry Egler and Fred Forbat, Arkitekter SAR. Offered post on return to Europe from Canada, for a second period with Swedish consultants.

Member of interdisciplinary team producing Master Plan for Port of Pitea, worked especially on C.B.D. Plan and Road Network Plan. Prepared detailed layouts and statutory town plans and regulations for several redevelopment areas in mining Town of Kiruna, including bus station, hotel and housing, shopping mall and parking structure. Designed housing layouts with both high and low density units in several Swedish towns, including Mariestad and Deje. Road network study related to office expansion and steelworks entrance for Avesta Jernverks AB.

Worked closely with leading engineering consultants such as AIB and Orrje and Company, also with architects such as Artur Von Schmalensee and Ralph Erskine.

Acted as translator and interpreter for international consortium.

Occasional guide duties, with foreign groups, for Swedish National Association of Architects (SAR).

1960-1961 Sudbury Planning Board, Sudbury, Ontario, Canada.

Urban Renewal Planner and Assistant City Planner.

Preparation of Sudbury Urban Renewal Study together with City's consultants (Project Planning Associates) and Sudbury Urban Renewal Committee. Organized extensive surveys and worked with sociologist on housing studies, staff supervision and subdivision control and layout designs. Assisted in preparation of major Official Plan Amendment, advised on Zoning applications and gave evidence at Municipal Board hearings. Deputized frequently for Director of Planning at Planning Board and Committee of Adjustment meetings. Public relations activities included several appearances on local television with the Mayor and other leading citizens. Assisted in studies for selection of site of Laurentian University.

1958-1960 Eglers Stadsplanebyrå AB, Architectural and Planning Consultants, Stockholm, Sweden.

Community Planner, directly responsible to and assisting Senior Partner, Erik-Olof Holmberg, Arkitekt SAR.

Worked on detailed designs and statutory town plans for redevelopment schemes in mining town of Kiruna and port of Pitea. Member of team, with Swedish architects and engineers, responsible for preparation of Master Plan for new satellite community of Jordbro for 15,000 persons south of Stockholm. Learned to speak Swedish sufficiently well to be invited to translate technical papers for Professor Uno Ahren at Royal Institute of Technology.

1951-1955 Northamptonshire County Council, Planning Department, Northampton, U.K.

Articled Apprentice Assistant to County Planning Officer.

General duties as a pupil, including land use and other surveys, ordnance map revision, survey and levelling of derelict mineral workings with instruments, drafting, town maps, site selection for town expansion with London Overspill population, housing layout, development control, including elevational control.

Part-time studies required under apprenticeship led to award of scholarship by County for full-time study at School of Planning, Nottingham College of Art & Design.

British citizen; married with two children.

Speaks English, Swedish, Norwegian.

Born 1922, Toronto, Ontario, Canada

Education University of Toronto, 1945, Bachelor of Applied Science and Engineering
University of Toronto, 1948, Ontario Secondary Schools Permanent Teaching Certificate
University of Western Ontario, 1957, Ontario Municipal Recreation Director's Permanent Certificate
University of Toronto, 1966, Master of Science in Planning, Thesis Subject: Citizen Participation in the Planning Process

Mr. Watts is a Senior Planner in Project Planning Associates Limited with a wide variety of experience in social, economic and physical planning. During his six years with the firm, his principal responsibilities have been related to social analysis and human resource development. In addition he has been responsible for subdivision plans, community and regional development plans and related economic, financial and employment analyses. With over twenty years of experience in planning, community organization, municipal recreation and education, Mr. Watts brings to each project a thorough understanding of municipal administration, citizen participation and community development processes.

Experience

The following are representative projects in which Mr. Watts has had primary responsibility in recent years.

Tourist and Recreation Plan, West Prince, Province of Prince Edward Island

As project director, Mr. Watts headed a team of tourist development specialists, economic analysts and architects in identifying long term investment priorities for tourism in the western part of Prince Edward Island. The project included identification of potential attractions, visitor forecasting, design capacity analyses for recommended investment locations, cost-revenue estimates, employment implications, and preparation of a phased master plan.

Southern Ontario Tourist Development Plan

Mr. Watts was chief planner in the preparation of long range tourist development concepts for the Province of Ontario. Major locations for tourist investment in the period 1970-1975 were identified, together with primary and secondary networks of travel corridors. Roles of the public and private sectors were outlined to meet the requirements of eight million annual visitors and five million residents of Southern Ontario.

This three-year study summarized the status of over 150 church congregations in Metropolitan Toronto. Church locations, membership, leadership and community interactions were surveyed and systematically analyzed. Alternative growth and change policies were presented to the Inter-Presbytery Planning Committee who represented some 100,000 church members and their families. (Mr. Watts was earlier in charge of the Study of York Presbytery, a suburban and rural group of United Churches, near Metropolitan Toronto.) Throughout these studies Mr. Watts helped develop planning committees in each congregation. He was thus able to discuss future possibilities in each local area and prepare local groups for their eventual responsibilities in plan implementation.

Urban Renewal

As chief planner for urban renewal studies in Kitchener, Ontario and Saskatoon, Saskatchewan, Mr. Watts headed a team of land development economists, planners, designers, architects and transportation engineers. Comprehensive, long-range plans for downtown urban centres were primary aspects of these studies and were based on detailed analyses of land uses, commercial space requirements, residents' attitudes, traffic data and housing needs. Implementation plans included detailed designs of utilities and physical infrastructures, cost-revenue estimates and phasing, public-private participation policies, public relations strategies and land use and design control procedures.

Community Planning

As a member of interdisciplinary teams, Mr. Watts has contributed to a variety of development plans for cities, towns, communities and neighbourhoods. In this field of work he has specialized in demographic analysis, planning for parks and recreation facilities and services, day care services and senior citizen services, school enrollment analyses and the placement and function of church facilities.

Recently, Mr. Watts spent several weeks in Britain and Northern Europe viewing and evaluating tourist developments and visitor participation patterns. He is particularly well versed in program-based tourist attractions such as sports events and arts programs.

Prior to his association with Project Planning Associates Limited, Mr. Watts was Director of Municipal Recreation for the City of Brantford, Ontario. In that capacity he was responsible for municipal recreation and parks administration, planning and community organization. He developed over twenty neighbourhood citizen recreation committees in Brantford to assist with planning and implementing recreation services. In his capacity as Director of Recreation, Mr. Watts was a member of the city's technical advisory committee for reviewing subdivision plans prior to referral to Planning Board and City Council. During his twelve years in Brantford, Mr. Watts organized the Brantford Symphony Orchestra and served as President in 1955.

Prior to his Brantford experience, Mr. Watts was a secondary school teacher in Ontario and Manitoba. He specialized in music, science, mathematics and history. During that time he coached athletic teams and was director of instrumental and choral groups.

Mr. Watts is a Past President of the Society of Directors of Municipal Recreation of Ontario.

Canadian citizen.

Speaks English.

Brendan Whelan

Education Westminster Technical College, London, England
Battersea Polytechnic College, London, England
Institution of Civil Engineers, United Kingdom, Entrance Certificate Civil Engineering, 1947

Memberships Member, Association of Professional Engineers of the Province of Ontario
Member, Corporation of Engineers of Quebec
Member, Engineering Institute of Canada
Fellow, Institution of Civil Engineers, United Kingdom
Member, Marine Technology Society

Experience

1969 to date

Staff Specialist, Construction Management, H.G. Acres & Company Limited.

1967-1969

Head, Construction Department, Northumberland Consultants Limited, Montreal, Quebec. Responsible for the preliminary construction engineering for the proposed Northumberland Strait Crossing (causeway + bridge + tunnel, 9 miles, \$150 million estimated capital cost), New Brunswick-Prince Edward Island. The work included research on current major construction techniques; studies of the effects on construction costs of construction procedures, heavy marine construction equipment, freight, taxes, escalation, raw and semi-processed materials, labour housing, schedules and cash flows; evaluations of construction costs versus alternative engineering designs; preparation of labour, equipment and material requirements schedules; and liaison.

1965-1967

Manager of Operations, Northumberland Consultants Limited, Charlottetown, Prince Edward Island. Responsible for the site management of all aspects of the design and construction of the proposed Northumberland Strait Crossing. The work included the direction of the geotechnical investigations (land and overwater drilling); the testing of various designs for marine structures and of wave, tide and ice effects on these structures; and the construction of seven miles of combined approach road and railway embankments with their associated interchanges and overpasses.

1964-1965

Senior Engineer, H.G. Acres & Company Limited. Responsible for the preparation of construction programs and schedules (C.P.M.), for the evaluation of construction methods, and for the preparation of construction cost estimates, specifications and tender analyses for various projects, including:

— Highway tunnel (\$24,000,000), Welland Canal, Thorold, Ontario

— Mactaquac Development (hydroelectric, \$110,000,000), New Brunswick

— Trent River Bridge (\$700,000), Trenton, Ontario

1963-1964

Administrative Engineer, Dufresne Engineering Company Limited. Responsible for the estimating, engineering, subcontract management, scheduling and purchasing for various projects, including:

— T.C.H. Richelieu River Bridge (Project Administrator) (prestressed concrete, \$4,400,000), Beloeil, Quebec

— St. Lawrence River Ice Control Structure (\$10,000,000), Montreal, Quebec

— Bridge (\$8,000,000), Three Rivers, Quebec

— A subway station (\$5,000,000), Montreal, Quebec

1962-1963

Chief Estimating Engineer, Fraser-Brace Engineering Company Limited. Responsible for the preparation of tenders on the construction of heavy foundations, subway transportation facilities, bridges, wharves, industrial buildings and water supply pipelines.

Management of the preparation of tender analyses, contract documents, special engineering designs, work allocations, project schedules and cost estimates.

Field supervision of geotechnical and foundation projects involving drilling, jetting, pile-driving, and grouting.

1954-1961

Executive Vice President and Chief Engineer, Mitchell Construction (Canada) Limited, Toronto, Ontario.

Executive responsibility for all aspects of the firm's activities in Canada.

Associated with the conception and development of Bramalea, a satellite town project near Toronto, Ontario.

Preparation of reports on the financing and construction of various proposed projects.

1952-1954

Project Manager, The Mitchell Construction Company, Peterborough, England. Responsible for all phases of the construction management for a can manufacturing plant having a capacity of 1,300 cans per minute.

1951-1952

Senior Engineer, A.M. Carmichael Limited, General Contractors, Edinburgh, Scotland. Responsible for the engineering and the management of material, equipment and labour for the construction of the underground powerhouse and associated works for a hydroelectric power development.

1948-1951

Engineer, Sir Alexander Gibb & Partners, Consulting Engineers, London, England. Responsible as Resident Engineer for the construction supervision for a 300-Mw coal-fired thermal electric power station.

Layout studies and designs for an 180-Mw thermal electric power station.

1947-1948

Technical Assistant, New Works Divisions, Transport Executive, London, England. Designs for the extension of a subway transportation system.

Harold Murray Wyne

Birth 1937, Canada.

Education Bachelor of Arts, 1964; Master of Arts (Community and Regional Planning) 1967, University of British Columbia.

Memberships Member, Town Planning Institute of Canada.

Experience

1971 (part)

Long-Range Planner, Planning Department, Borough of Scarborough (Metropolitan Toronto).

Mr. Wyne prepared an in-house appraisal of both the policy-content and the general format and layout of the Borough's Official Plan. Special attention was directed towards identifying aspects of the Plan which appear not to be responsive to current and probable future development pressures and trends.

On the basis of his findings Mr. Wyne formulated a number of policy-oriented research proposals which he suggested should be initiated by the Planning Department.

1969-1971 (part)

Section Head, Lake Erie and Niagara Economic Development Regions, Regional Development Branch, Department of Treasury and Economics, Government of Ontario, Toronto.

Mr. Wyne's duties centred around the preparation of comprehensive socio-economic base studies for both the Lake Erie and Niagara Economic Development Regions. The primary, secondary and tertiary sectors of the economy were analyzed, their problems isolated and the implications for future economic development assessed. Particular importance was directed towards identifying and understanding the requirements of those economic activities which are basic, or export oriented and whose performance therefore is an important determinant of future growth.

During the preparation of these studies Mr. Wyne supervised a staff of two economists, two geographers and a community planner.

Mr. Wyne represented the Regional Branch on three inter-departmental bodies: The Task Force for the Establishment of Multiple-Use Service Corridors in southwestern Ontario; the Grande River Watershed Development Study; and, the Regional Municipality of Niagara Technical Liaison Committee. The last-mentioned committee was responsible for coordinating municipal and provincial development planning in the Regional Municipality of Niagara.

Mr. Wyne has made formal presentations on behalf of the branch to senior-level government committees and boards, the Lake Erie and Niagara Economic Development Councils, and he has participated in branch sponsored public meetings.

1967-1969 (part)

Associate Planner, Oldman River Regional Planning Commission, Lethbridge, Alberta.

Mr. Wyne participated in a major capacity in an interdisciplinary study of the Alberta portion of the Crowsnest Pass. The objective of the study was to prepare a comprehensive development plan for the Crowsnest Pass area within the framework of a long range plan supported by development policies and a program of implementation. The plan was based on a detailed analysis and projection of social and economic conditions and land use requirements and included a positive program for urban renewal.

Mr. Wyne was particularly involved in integrating the economic and land use components of the study.

Mr. Wyne was also involved on an on-going basis with the preparation and implementation of a general plan, a zoning by-law and a five year capital works budget for a service community of 1,600.

The execution of his planning duties involved numerous meetings with town and county councils, municipal and provincial technical personnel, and private citizens.

1966 (part)

Planners Assistant, Central Okanagan Advisory Planning Board, Kelowna, British Columbia.

Duties involved conducting a detailed land use survey of 1,300 square miles of orchard, waterfront recreational, and suburban residential developments. The survey constituted the first step in the formulation of a development plan for the region.

G.M. Yost

Born	1929, Yakima, Washington, U.S.A.
Education	Bachelor of Architecture, University of Oregon, 1955 City and Regional Planning, Massachusetts Institute of Technology, M.C.P., 1960
Academic Attainments	Ellen M. Pennell Scholar, University of Oregon 1951-52

Mr. Yost is a principal of and a planner in Project Planning Associates Limited undertaking studies in the fields of human and natural resource development, education and recreation.

Mr. Yost has delivered lectures to Portland State University in city planning and urban renewal 1958; Harvard University, Landscape Architecture Department, G.S.D. in city planning and urban design 1961; University of Toronto, Dept. of Architecture in traveler facilities 1969; Queen's University, Dept. of Civil Engineering in recreational planning 1970.

He has assisted Canadian Indian tribal bands in the study and scheduling of resource development of their isolated reserves. He was also instrumental in assisting a private Indian group in establishing an Indian Cultural Centre in Toronto. Mr. Yost is a member of the Board of the Manitou Arts Foundation of Canada.

Experience

1966 to date

Principal planner, Project Planning Associates Limited. He has been responsible for comprehensive analyses and studies for the Ontario Recreation and Tourist Demand Program and provided regional, population, economic and recreational projections, as part of the team preparing the Wasaga Beach Park and Community Development Plan, Ontario, Canada. He has been involved in many projects with respect to planning, law and administration and regional master planning. He has undertaken appraisals of recreation and community development of the Muskoka District, Ontario, Canada.

Mr. Yost, as Study Director of the Kingston 1976 Olympics Feasibility Study, appraised the capability of the City of Kingston to host the 1976 sailing events. This involved analysis of several waterfront sites within the City of Kingston, existing harbour facilities, accommodation and food service conditions, and the cultural, fine and performing arts programs now operating in the region. The product of the study was a documented appraisal of the City's capability to meet the challenge of the proposed events.

He was Principal in charge of the Tourist and Recreation Plan, West Prince, Province of Prince Edward Island, Canada. This

study involved a six month appraisal and development of a master plan for extending the tourist season, attracting more visitors and providing the basis for higher per capita tourist spending in one third of the province. The work also involved close liaison with Government and citizen groups and the identification and development of structures, during the planning phase, that ensure its implementation. The product of this study was a documented schedule of investments for a fifteen year development period.

He was Principal in charge of the Southern Ontario Tourist Development Plan which identified primary areas of year-round tourist potential. This study involved appraisal of the most heavily utilized recreational portions of the province that contain 85% of the Province's extensive tourist physical plant. A development and investment schedule was prepared to guide government's participation in seeding programmes to 1975.

Mr. Yost provided the tourist development component of a company team appraising the proposed 12,000 acre Frigate Bay Scheme in the southeast corner of the Island of St. Kitts in the Caribbean. This involved estimates of future visitor arrivals by way of air and sea corridors; the capability of the Island's existing labour force to provide managerial and operational support for the proposed development and the overall Island attractiveness to sustain future tourist interest.

Mr. Yost was Principal in charge of the Appraisal of 1969-70 Capital Grants made by the provincial government to Indian Communities in Northwestern Ontario. The work involved site appraisal and interviews in Indian communities undertaking recreational and related capital works projects. The thrust of the study was to measure economic and social gains afforded by public investments in culturally remote communities.

Mr. Yost was the Project Director on the following projects:

Chazy Lake Property Appraisal, N.Y. State-Boise-Cascade
Land Use Component - Toronto II Airport Study
Recreation & Community Development on the Canadian Shield portion of Southern Ontario-Muskoka and Bala
Master Plan for Cambrian College, Sault Ste. Marie
Master Plan - Queen's University - West Campus
Plan for Algonquin Park
Wilson Century Site Development Plan - Etobicoke

He was a principal planner in carrying out the following projects:

Y & R Properties Limited - Kitchener- Subdivision
Wilson Property - Oshawa - Subdivision
Hermitage Subdivision - Edmonton.

He was the Recreational Specialist for the Welland Canal Study and the Canadian National Exhibition evaluation and expansion program.

1964-1966

Mr. Yost was a Principal and Senior Planner with Sasaki Strong Associates Limited. In this capacity he was responsible for the following projects:

Lakehead University Master Plan
Etobicoke Centennial Park
Str. Andrew's Centennial Park (N.S.)
Point Pelee National Park
Murphy's Point Provincial Park
Master Plan & Implementation - McMaster University
LaRonde Marina Feasibility Study, Expo'67
Waterloo Civic Square-Urban Design Plan

1961-1964

Mr. Yost was a Senior Planner with Sasaki Dawson Demay Incorporated and participated in the following projects:

International Village - Downtown Detroit Renewal Proposal
McMaster University Development Plan
Cambridge Street, Urban Design Study - Boston
Middlebury College Development Plan
University of Massachusetts - Plan Implementation Studies
Rhode Island College - Master Plan Studies
University of Rhode Island Plan Implementation Studies
University of Colorado Plan Implementation Studies
Don Valley Park & Recreation Planning Concepts
Don Valley Zoo Site Evaluation

1959-1961

Mr. Yost was a Research Associate with the Greater Boston Economic Study Committee, a private regional planning group, and participated in the following studies:

Recreational Land Use and Open Space in Greater Boston
Analysis of Major Land Use in Greater Boston
Assembly & Processing of Land Use in Greater Boston (150 cities and towns).

1956-1958

Mr. Yost was an Intermediate Planner with the Portland Oregon Planning Commission and Urban Renewal Commission. He participated in the following studies:

South Auditorium Site Urban Renewal Study
Multuroma District Development Plan
North St. John's Downtown Redevelopment Study

Mr. Yost has been

Chairman, Standing Research Committee 1961 Chapter AIP
Member of Standing Research Committee 1959-61
Member Pacific N.W. Chapter AIP Urban Renewal Committee 1959.

American citizen.

Speaks English.

Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

OUR SPECIALIST

CONSULTANTS

Born 1929, Auckland, New Zealand

Education: Interim in Group Leadership, MTL Institute for Applied Behavioural Science, Washington, D.C., 6 weeks, 1970
Boston University Human Relations Center, Human Relations Laboratory (group dynamics seminar), 2 weeks, 1969
Case Institute of Technology, Cleveland, Ohio, Human Relations Laboratory, 2 weeks, 1966
Ph.D. Cornell University, Ithaca, New York, Rural Sociology, Cultural Anthropology, General Sociology. Thesis: "Toward a Theory of Selective Migration and Residence.", 1963
B.Sc., Cornell University, Sociology, Anthropology, Thesis: "The Cross-Cultural Diffusion of a Social Movement.", 1962
B.Sc., University of Toronto (O.A.C.), Agricultural Economics, 1957
Essex Institute of Agriculture, U.K., National Diploma in Agricultural Engineering, 1954
Massey Agricultural College, University of New Zealand, Diploma in Agriculture, 1951.

Dr. Connor is a Consulting Sociologist specializing in the design and supervision of research and action programs for community, regional and organizational development. Extensive teaching experience both in universities and in-service development program co-ordination. Author of numerous reports and publications for professional journals and for government agencies. Public speaking, radio and television appearances.

Demonstrated proficiency in: design and use of modern research techniques applied to demographic, cultural and attitude studies; diagnostic analysis of social system problems, and related program planning; application of relevant behavioural science concepts to modern management practices and organizational development.

Professional background in agricultural science, agricultural engineering, sociology and anthropology, in New Zealand, United Kingdom, United States and Canada.

Experience

1967 to date

D.M. Connor Development Services Limited, Ottawa, Ontario. Consulting Sociologist: Consultant to government and business on sociological and anthropological research, program design and implementation; contracts for direction of regional, community and management development programs through research and training; lecturing; writing; publishing.

1963-1967

St. Francis Xavier University, Antigonish, Nova Scotia. Associate Professor: Taught university classes in Introductory Sociology, Research Methods, Community Development, Social Anthropology. (Concurrent with socio-economic research studies.)

1962-1966

Peace Corps, Washington, D.C. Trainer: Co-ordinated Community Development and Co-operative training for 22 volunteer Peace Corps groups destined for Asia, Africa, South America, West Indies. (Concurrent with education and university work.)

1960-1963

See under "Education".

1957-1960

Extension Department, St. Francis Xavier University, Antigonish, Nova Scotia. Fieldworker: Fostered social and economic development among low-income people in eastern Nova Scotia.

1954-1957

See under "Education".

1951-1956

Earlier employment in New Zealand, Britain and Canada, in agriculture research and practice and soil and water conservation e.g. Hydrometric Survey of river system in northern Manitoba, and Farm Management Survey in Ontario.

Functional Specialties:

Research

Titles shown under "Selected Publications", indicate the subject matter, breadth and field of interest in research. The principal emphasis has been on research design and methodology to meet particular problems of rural, regional and organizational development, applying theories of social and cultural change, training programs, evaluation, selective migration, etc. Currently, research consultant for such agencies as: Science Council, and the Department of Energy, Mines and Resources.

Teaching

Subjects include: Community Development, Rural Sociology, Introductory Sociology, Social Anthropology, Research Methods, Introductory Economics, Agricultural Economics, Vocational Agriculture, Co-operatives. Students include: university undergraduates (St. Francis Xavier, State University of New York, Carleton University); high school students; Peace Corps and C.U.S.O. volunteers; Northern Service Officers; Community Development Officers; Indians and Metis; clergy; adult citizens.

Additional training functions: designing and writing new training aids and materials, developing curricula to meet special needs, advising on the use of training to effect cultural change, planning and operating in-service training programs for administrators and staff. Currently training consultant to: Public Service Commission, Department of Energy, Mines and Resources, U.S. and Canadian church groups.

Management

Development and management of private consulting service and Press; background in management principles and practices; organization, direction and co-ordination of groups of development workers; focus on improving the administration of development agencies, including techniques for creating constructive public participation in the planning process.

Selected Publications:

Research Reports

"Public Participation in the St. John River Basin Project"; internal paper prepared for the Department of Energy, Mines and Resources, December, 1969. (12 pp. mimeo.)

"Sociology as a Contributor to Fisheries and Wildlife Research and Management"; internal paper prepared for the Science Council of Canada, August, 1969. (26 pp. mimeo.)

"Rural Institutions and Rural Values as Related to Rural Development in Canada." Canadian Council on Rural Development, Ottawa, April, 1968. (56 pp. mimeo.)

"Stimulating Rural Development in Canada: A Case Study"; Rural Development Branch, Department of Forestry and Rural Development, Ottawa. September, 1968. (24 pp. mimeo.)

"The Development of Health Services in a Rural Hospital Region"; (Administrative Report, co-author with K.R. Davidson). Antigonish, Nova Scotia, August, 1967.

The Role of Education in Rural Development; (co-author with D.W. Magill) A.R.D.A., Ottawa. December, 1965.

Journal Articles

"A Participative Approach to Inservice Training and Evaluation" (with S.H. Searle), *Canadian Training Methods*, September, 1970.

"A Perspective on Rural Sociology in Canada and its Implications", *Rural Sociology*; (with J.M. Curtis), Vol. 35, No.2, June, 1970.

"An Emergent Professional Community: French and English sociologists and anthropologists in Canada", *Social Science Information*, Vol. 9, No.4. (with J.E. Curtis and J. Harp.)

"Rural Anti-Poverty Policy for the Future", *Canadian Journal of Agricultural Economics*, Vol. 16, No.3, 1968.

"Four Roles for the Development Worker: An Approach to Training and Action", *Community Development Journal*, No.8, October, 1967.

"A Typology of Residents for Community Development", *Anthropologica*. Vol. 9, No.2, 1967.

"Training for the Poverty War," *Canadian Welfare*. Vol. 43, No.3. May-June, 1967.

"The Antigonish Movement — Adult Education Through Co-operatives", *Readings In Co-operative Education*. International Co-operative Alliance, New Delhi, 1965.

"Selective Migration and Residence: A Theory with Implications for Practitioners", *International Migration*, Vol. 2, No.2, 1964.

Monographs

Learning for Individual and Social Development. (with S.M. Searle and K.T. Bradley). Department of Regional Economic Expansion, Ottawa, 1970.

Sociology and Anthropology in Canada (with J.E. Curtis), Canadian Sociology and Anthropology Association, Montreal, 1970.

Agricultural Science in Canada. (with B.N. Smallman *et al.*) Science Council, Ottawa, 1970.

Strategies for Development. Development Press, Ottawa, October, 1968. (4,000+ copies)

Diagnosing Community Problems. Antigonish, Nova Scotia, October, 1966. (4,000+ copies)

Understanding Your Community. Antigonish, Nova Scotia, April, 1964. (10,000+ copies).

Memberships Member, American Sociology Association
Member, American Society for Public Administration;
Member, Rural Sociology Society (member, Program Committee, 1963-5)
Member, Society for Applied Anthropology
Member, Canadian Sociology and Anthropology Association, (Executive Member, Chairman of Research Committee, 1966-9)
Member, Society for International Development.

Education University of Wisconsin, Dept. Education and Biology, B.S., 1945-1949
University of Wisconsin, Dept. Wildlife Management, M.S., 1950-1952
Fellowship, University of Montana, Dept. Zoology, Summer 1951
University of Wisconsin, Dept. Veterinary Science and Wildlife Management, Ph.D., 1957-1959

Guest lecturer on land use ecology, Universidad de Buenos Aires, Department of Zoology.

Guest lecturer on ecosystem management, University of Michigan, International Short Course for National Park Administration.

Member, Five-man special mission to advise Peruvian Government on the possibility of establishing a National Park in the tropical rain forest.

Memberships Member, The Wildlife Society
Member, American Society of Mammalogists
Member, Society of Protozoologists
Member, American Society of Parasitology
Member, Association for Tropical Biology
Member, Wildlife Disease Association
Member, Ecological Society of America
Member, Helminthological Society of Washington
Member, Canadian Society of Zoologists
Member, Canadian Association of Geographers

Technical Co-ordinator for the Pan-American Union sponsored ministerial conference on renewable natural resources, held in Mar del Plata, Argentina, October, 1965.

1964-1967

Program Specialist, Department of Scientific Affairs, Pan-American Union, (Organization of American States), Washington, D.C. Assessment of intergovernmental biological programs in the field of renewable natural resources, and programs of basic biology for the 19 member countries of the Pan-American Union.

Awards, Fellowships

Wildlife Society Publication Award for Terrestrial Ecology, 1961;
NSF Grant for Research on Wild Rodents, 1961-1965;
National Research Council Interim Research Grant for Study of the Ecology of Coccidiosis, 1967;
Central Mortgage and Housing Corporation Research Grant for Ecology of Subdivision Design, 1967 and 1968;

1963-1964

Achievement of Associate Professorship (tenure).

1959-1962

Assistant Professor, Department of Botany and Zoology, University of Wisconsin in Center, Green Bay.

Experience

1958-1959

Instructor, Department Veterinary Science, University of Wisconsin.

1969 to date

1949-1957

Participant Royal Architectural Institute of Canada to appraise the Federal Task Force Report on Housing, Toronto.

Conservation Biologist, Wisconsin Conservation Department, Madison, Horicon and Ladysmith, Wisconsin.

1968

Publications and Papers

Lecture series University of Florida, Tropical Institute of Agriculture, Forestry School and Veterinary School.

Dorney, R.S. and A.J. Rusch. 1953. Muskrat growth and litter production. Tech. Wildlife Bull. No.8, 32 pp. Wis.Cons.Dept., Madison.

1967

Dorney, R.S. 1953. Some unusual juvenile raccoon weights. J. Mamm.34: 122-123.

Guest lecturer on Renewable Natural Resources in Latin America: Problems, Policies and Research Needs. Cornell University, Department of Conservation, Ithaca, New York.

Dorney, R.S. 1954. Wisconsin ruffed grouse 1949-1953. Wis.Cons.Bull. 19:23-24.

Associate Professor, Department of Geography and Planning, University of Waterloo.

Dorney, R.S. 1954. Ecology of marsh raccoons. J.Wildl.Mgmt. 18:217-225.

1966

Chairman, Conservation Section, Symposium on the Biota of the Amazon, Co-sponsored by the Museum Goeldi and the Association for Tropical Biology, Belem, Brazil.

Lecturer, International Short Course for National Park Administrators.

- Dorney, R.S. 1955. Do ruffed grouse need a closed season? Wis.Cons. Bull. 20:10-11.
- Dorney, R.S. 1965. Trapping techniques for ruffed grouse. J.Wildl.Mgmt. 20:47-50
- Dorney, R.S. 1956. Habitat quiz for grouse hunters. Wis.Cons. Bull. 21:10-12.
- Dorney, R.S. (Godfrey, John) 1956. How to find ruffed grouse. Outdoor Life Nov. pp.66-71.
- Dorney, R.S. and F.V. Holzer, 1957. Spring aging methods for ruffed grouse cocks. J.Wildl.Mgmt. 21:268-274.
- Dorney, R.S., D.R. Thompson, J.B. Hale and R.F. Wendt, 1958. An evaluation of ruffed grouse drumming counts. J.Wildl.Mgmt. 22:35-40.
- Dorney, R.S. 1958. Ruffed grouse roosts as a spring-census technique. J.Wildl.Mgmt. 22:97-99.
- Dorney, R.S. and A.C. Todd. 1959. Occurrence of *Hepatozoon* in gray squirrels in Wisconsin, J. Parasitol. 45:309.
- Dorney, R.S. 1959. Relationship of ruffed grouse to forest cover types in Wisconsin. Tech. Bull. No.18, 32 pp. Wis.Cons.Dept. Madison.
- Dorney, R.S. and A.C. Todd. 1960. Spring incidence of ruffed grouse blood parasites. J. Parasitol. 46:687-694.
- Dorney, R.S. and C. Kabat. 1960. Relation of weather, parasitic disease and hunting to Wisconsin ruffed grouse populations. Tech. Bull. No.20, 66 pp. Wis.Cons.Dept. Madison.
- Dorney, R.S. 1962. Coccidiosis of Wisconsin cottontail rabbits in winter. J. Parasitol. 48:276-279.
- Dorney, R.S. 1962. A survey of the coccidia of some Wisconsin Sciuridae with descriptions of three new species. J. Parasitol. 9:258-261.
- Dorney, R.S. 1963. Helminth infections in wintering cottontails. J.Wildl.Mgmt. 27:175-179.
- Dorney, R.S. 1963. Coccidiosis-Incidence, Epizootiology in two Wisconsin Sciuridae. Trans.No.Amer.Wildl. Conf. 28:207-215.
- Hale, J.B. and R.S. Dorney, 1963. Seasonal movements of ruffed grouse in Wisconsin. J.Wildl.Mgmt. 27:648-656.
- Dorney, R.S. 1963. Sex and age structure of Wisconsin ruffed grouse populations. J.Wildl.Mgmt. 27:599-603.
- Dorney, R.S. 1965. Epizootiology of trypanosomiasis in two Wisconsin Sciuridae. J. Parasitol. 51(2), Sec. 2, paper No.7.
- Dorney, R.S. 1965. Incidence of Botfly Larvae (*Cuterebra emasculator*) in the chipmunk (*Tamias striatus*) and red squirrel (*Tamiasciurus hudsonicus*) in Northern Wisconsin, J. Parasitol. 51(5):893-4.
- Dorney, R.S. 1965. The OAS — its role in integrating conservation efforts in the Americas. 5 pp. mimeo.
- Dorney, R.S. 1966. Suggested methods for integrating the US-IBP program with scientists and scientific institutions in Latin America. 5 pp. mimeo.
- Dorney, R.S. 1966. A new method for sexing ruffed grouse in late summer. J.Wildl.Mgmt. 30(3):623-625.
- Dorney, R.S. (in press): Present status of existing and proposed national parks and national reserves in the Amazon Basin. Conf. Biota of the Amazon, Belém, Brasil, Assoc. Trop. Biol.
- Dorney, R.S. and J. Milton (in press): Estado de las actividades de conservación de los países Americanos: 1965 Documentos técnica derivados de la Conferencia Especializada Interamericana para Tratar Problemas Relacionados con la Conservación de Recursos Naturales Renovables del Continente, Mar del Plata, Argentina, 1965. (in Spanish).

Geraud Jarlan

Born 1925

Education B.Sc. - Lic. Es. Sc. Engineering Physics, 1950
Advanced studies in England, U.S.A., and Sweden in Applied Mathematics and Oceanography
Doctory of Sciences, D.Sc. in Dynamical Meteorology, 1962

Experience

1966-1969

International Consultant in off-shore Development and Coastal Engineering projects.

Scientific Adviser to oil companies for off-shore developments.
Consultant to the O.E.C.D. 1966-1968.

Mission in Tunisia for the World Bank in connection with the study of the Development of Transports and related investments.

Missions in the Middle East and in the South Pacific for the Development of the Kuwait waterfront and harbour studies in the Fiji islands.

1956-1966

Senior Research Officer at the National Research Council of Canada (Ottawa).

(Head of the Coastal Engineering and oceanographical studies).
Harbour development and connected Economic studies.

Theoretical studies of estuary development (St. Lawrence River and St. John River).

1958-1960: Visiting Professor of coastal engineering and Fluid Mechanics at Laval University (Quebec).

1956-1964

Part-time lecturer of applied mathematics (University of British Columbia).

Engineer in charge of the Fraser River movable bed model (350 feet long).

1950-1953

Head of the Research Branch Le Havre Port Authority.

Research on Problems dealing with wave studies in connection with the harbour reconstruction — Programme (Tides, Estuarine circulation, Sedimentology and Soil Mechanics).

In 1953, from May to September, Mr. Jarlan was sent to Madagascar by the Ministry of Public Works as an expert in connection with the Development of Tamatave, Fort Dauphin, Diego Suarez, and Majunga harbours.

Exploration of the Southern part of the Island of Malagasy for possible relocation of Fort Dauphin harbour.

In 1952 (6 months), he was a visiting professor at the Technical University of Hanover Institute (Germany) — Franzius Institute.

While in Canada, Mr. Jarlan conducted studies on 18 models of harbours and designed 22 breakwaters and 39 harbours, of which 12 were built, for the Federal Department of Public Works of Canada.

He carried out theoretical studies in harbour development and related economic aspects.

During 1964-1965, Mr. Jarlan was sent as an expert for the World Bank in East Pakistan for the Development study of the Ganges Delta Islands transport and communications plan.

He is the inventor of the perforated vertical wall breakwater, built for the first time at Bay Comeau (Canada 1962).

He holds 9 patents in coastal engineering. He is a member of various scientific organizations and has published a large number of papers on his scientific works.

French citizen.

Speaks French, English, German, Russian and a little Madagascan.

Austin Donald Misener

Education Graduated from the University of Toronto, B.A. 1933, M.A. 1934, 1st Honours Mathematics and Physics, S.H. James silver medal in Physics, N.R.C. scholarship 1934-1936
Graduated, Cambridge University, Ph.D., 1938, 1851 Exhibition Scholarship 1936-1938, Demonstrator, Cavendish Laboratory
Research Fellow — University of Bristol, 1938-1939, Lecturer in Atomic Physics

Experience

1968 to date

President, International Association on Great Lakes Research.
Service on various Associate Committees, Advisory Committees, Special Committees, and Commissions of N.R.C., D.R.B., Government of Ontario and Ontario Economic Council.

1961-1964

Ontario Economic Council.

1948-1961

Ontario Economic Council.

1949, Elected Fellow of the Royal Society of Canada.

1951-1952, President, Canadian Association of Physicists.

1945-1950, Registrar, Canadian Association of Physicists.

1944-1945

Partner, Meadows, Critoph and Misener.

1943-1944

Assistant Chief Engineer, Armstrong Wood & Co.

Positions

University of Toronto, Lecturer, Physics 1940-1942. On leave of absence to N.R.C. 1942-1944. Assistant Professor, Physics, 1945-1949.

University of Western Ontario, Professor and Head Department of Physics, 1949-1960.

Ontario Research Foundation, Director, 1960-1964.

University of Toronto 1965-, Director, Great Lakes Institute 1966-, Professor Physics Department.

Education Ph.D. (Geography), University of Chicago, 1953
M.A. (Geography), University of Colorado, Boulder, Colorado, 1948
Graduate study (Geography), University of California at Los Angeles, 1943
A.B. (Geography, Economics, History), University of Colorado, Boulder, 1941

Memberships International Geographical Union, Commission on Regional Aspects of Economic Development (Appointed Member, 1969)
Canadian Association of Geographers (Member, 1961 to present) Chairman, Statistics Committee, 1966
American Association of Geographers (Member, 1946 to present)
Member, Commission on College Geography, 1965-1967
Member, Program Committee, Annual Meeting, 1957, 1966
Member, Toronto Local Arrangements Committee, Annual Meeting, 1966
Member, Credentials Committee, 1956-1959 (Chairman, 1959)
Vice-President, New England Division, 1947-1948
Canadian Association of American Studies (Founding Member, 1964)
Vice-President, 1965-1967
Simcoe Chapter of Lambda Alpha (Honorary Land Economics Fraternity) (Founding Member, 1967)
President, 1969-1970
Alpha Pi Zeta (Member, 1956 to present)
Sigma XI (Member, 1955 to present)
American Geographical Society (Member, 1952 to present)
Salisbury and Asher Fellowships, 1951, University of Chicago

Academic Appointments Professor of Geography, Queen's University, Kingston, Ontario, 1963 to present
Associate Professor of Geography, Queen's University, Kingston, Ontario, 1961-1963
Visiting Associate Professor of Geography, Northwestern University, Evanston, Illinois, 1959
Associate Professor of Geography and Head of Department, University of Omaha, Omaha, Nebraska, 1955-1957
Research Associate, University of Chicago, 1954-1955
Instructor of Geography, University of Missouri, Columbia, Missouri, 3 years
Instructor of Geography, Gorham State College, Gorham, Maine, 3 years

Experience

Director, Regional Development Branch, Department of Treasury and Economics, Province of Ontario, Toronto, Ontario, (leave of absence from Queen's University, January 1967 to September, 1971) for the creation and initiation of a program of more orderly regional planning for the Province. The program has three major objectives: (1) encouragement of each region to attain its socio-economic potential, (2) wise use of the natural environment and (3) reduction of unnecessary duplication in provincial services. A staff of 59 has been recruited, with a further 9 to be added in 1971. In addition to staff output, university research in regional development is financed by a special fund, and regional councils, reporting to the Branch, are encouraged to (1) submit recommended programs, and (2) subject tentative provincial plans to advisory review. The program is in three stages: (1) inventory of existing programs, policies and information (1967), (2) completion of a massive trend study of population and selected socio-economic activities (1968), and (3) initiation of a plan for each region (1969). The Department of Geography at Queen's University is preparing an atlas for publication based on the trend study.

Consultant, Resources for the Future, Inc., Washington, D.C., 1960, especially to act as geographic editor for *Regions, Resources and Economic Growth*.

Consultant, Area Redevelopment Administration, U.S. Department of Commerce, Washington, D.C., 1958, 1960, to initiate and implement planning and development in selected areas of the United States.

Queen's University

Geography Department, Supervisor, Summer School Activities, 1964, 1965.

Chairman, Graduate Committee, 1965-1966.

Member, Editorial Board, *Queen's Quarterly* (A Canadian Review), 1962-1966.

Chairman, Committee on Graduate Scholarships and Fellowships, Social Science Division, Graduate School, 1966.

Chairman, Sabbatical Leave Committee, Queen's Faculty Association, 1965-1966.

Member, Arts Research Committee, Queen's Faculty Association, 1963-1966.

Publications — Books

(With Jesse H. Wheeler, Jr., and J. Trenton Kostbadd), *Regional Geography of the World*, Third Edition, Holt, Rinehart and Winston, New York, 1969, 798 pp.

(With Edgar C. Conkling and Maurice H. Yeates), *The Geography of Economic Activity*, Second Edition, McGraw-Hill Book Company, New York, 1968, 561 pp.

(With Edgar C. Conkling), *The Geography of International Trade*, Foundations of Economic Geography Series, Prentice-Hall, Englewood Cliffs, New Jersey, 1967, 186 pp.

(With Maurice H. Yeates), *Delimitation of Development Regions in Canada, (With Special Attention to the Georgian Bay Vicinity)*, Report to the Area Development Agency, Canadian Department of Industry, Ottawa, 1966, 134 pp.

(Co-editor with W. Donald Wood), *Areas of Economic Stress in Canada*, Queen's University Industrial Relations Centre, Kingston, Ontario, 1965, 221 pp.

(Co-editor with Donald J. Patton), *Focus on Geographic Activity: A Collection of Original Studies*, McGraw-Hill Book Company, Inc., New York, 1964, 199 pp.

The Geography of Economic Activity, McGraw-Hill Book Company, Inc., New York 1962, 602 pp. (Also translated into Spanish.)

(With Jesse H. Wheeler, Jr. and J. Trenton Kostbade), *Regional Geography of the World*, Second Edition, Holt, Rinehart and Winston, New York, 1961, 674 pp.

Free Ports and Foreign-Trade Zones, Cornell Maritime Press, Cambridge, Maryland, 1956, 203 pp.

(With Jesse H. Wheeler and J. Trenton Kostbade) *Regional Geography of the World*, Henry Holt and Company, New York, 1955, 628 pp. (Also translated into several languages.)

The Changing Occupance Pattern of the Tri-State Area, Missouri, Kansas, and Oklahoma, University of Chicago, Department of Geography, Research Paper No. 31, 1953, 139 pp.

Publications – Articles in Referred Journals

"Initial Policies and Strategies for Development in Ontario," *Ontario Geography*, 4:5-12 (1969)

"Economic Geography," *The Canadian Geographer*, Centennial Edition, 11:4, pp. 366-371 (1967).

"Identifying and Treating Internal Areas of Economic Stress in the United States and Canada," *Saertryk af Kulturgeografi*, University of Aarhus, Denmark, 96: 165-167 (1965).

"Some Comments on *The Science of Geography*," *Professional Geographer*, 17, 6:8-10 (1965).

"Internal Areas of Economic Stress: Some Canadian Approaches," *University of Colorado Studies, Series in Earth Sciences*, 3:77-90 (1965).

"Trade Relationships between the European Economic Community and the United States," *East Lakes Geographer*, 1:29-39 (1964).

"Economic Geography and Economic Underdevelopment," (Guest Editorial) *Economic Geography*, 38:189 (1962).

"Foreign-Trade Zones of the United States," *Geographical Review*, 42:631-645 (1952).

"Portland, Maine: An Economic-Urban Appraisal," *Economic Geography*, 27:348-367 (1951).

Publications – Other Technical Writings

"Ontario's New Regional Development Program," paper presented to the Commission on Regional Aspects of Economic Development, International Geographical Union, Vitoria, Brazil, 1971.

"Regional Development in Ontario," invited paper presented to Annual Meeting, Canadian Association of Geographers, St. John's, Newfoundland, 1969.

"Regional Development in Ontario," invited paper, Biennial Meeting, Pan American Institute of Geography and History, Santiago, Chile, 1969.

"Regional Development in Ontario," invited paper presented to Annual Meeting, Community Planning Association, St. John's, Newfoundland, 1969.

"Economic Geography," *Internatiional Encyclopaedia of the Social Sciences*, MacMillan and Free Press, Vol. 6, pp. 123-9 (1968).

"Provincial Approaches to Regional Development," invited paper to the American Industrial Development Conference, Boston, August, 1967.

"Continuing and New Viewpoints in the Geography of Economic Activity," *Introductory Geography, Viewpoints and Themes*, Commission on College Geography, Publication No. 5, pp. 45-49 (1967).

"Regional Development," *Regional and Transportation Planning*, Civil Engineering Report No. 55, Queen's University, Kingston, pp. 9-12 (1967).

(With Gerald McGrath) "Regional Statistics and Their Uses: A Geographical Viewpoint," *Papers and Proceedings of the Conference on Statistics*, Canadian Political Science Association, 50 pp., (1965).

"Areas of Economic Stress in Canada," *International Conference on Regional Development and Economic Change*, Department of Economics and Development, Province of Ontario, pp. 18-26 (1965).

Geographic editor for: *Regions, Resources, and Economic Growth* (Harvey S. Perloff, Editor; Baltimore, Johns Hopkins Press for Resources for the Future, Inc., 1960).

"Free Ports and Foreign-Trade Zones: A Summary Review," Harold M. Mayer and Clyde F. Kohn, *Readings in Urban Geography*, University of Chicago Press, Chicago, 1959, pp. 388-391.

Publications - Other Articles

"1965-1975: A Decade of Decision Concerning Underdevelopment," *Spotlight*, World University Service of Anda, Kingston, 1:2 pp. 7-14 (1964).

Reviews

"Economic Geography of Canada, (C.P. Camu, E.P. Weeks, and Z.W. Sametz; Toronto-MacMillan of Canada, London - MacMillan and Company; 1964)" *Queen's Quarterly*, LXXII: 195-196 (1965).

"Economic Backwardness in Historical Perspective; A Book of Essays (Gerschenkron, Alexander; Cambridge - Harvard University Press, 1962)" *Queen's Quarterly*, LXX:627-8 (1964).

"Recent Methodological Contributions to German Economic Geography," *Annals of the Association of American Geographers*, 48:92-96 (1958).

"German Planning Atlas," *Geographical Review*, 46:120-121 (1956).

Research in Progress

Analysis of Regional Development in Ontario, to be published late in 1971 or early in 1972.

Revision of *The Geography of Economic Activity*, to be published in 1973.

A monograph on planning and development potential and accomplishment in Canada and the United States, to be published in 1973 or 1974.

Recent Research Grants

Area Development Agency, Canadian Department of Industry, Ottawa, 1965, contract to formulate criteria and principles generally applicable to delimitation of development regions. Results published with M.H. Yeates. (see p.4, item 4).

Area Development Agency, Ottawa, and Department of Economics and Development, Province of Ontario - Grant for

conducting a two-day international conference on Areas of Economic Stress in Canada. Conference held January, 1965, Queen's University, Kingston, Ontario. Proceedings published. (see p.4, item 5).

Canadian Department of Labour and Ontario Department of Economics and Development, 1963-1965, grants to determine journey-to-work patterns in selected National Employment Service areas in Ontario and Quebec.

Arts Research Committee, Queen's University, 1962-1963, grant to initiate study in journey-to-work patterns, as described immediately above.

U.S. Office of Naval Research, Washington, D.C., 1954-1955, contract to study the effectiveness of the free port device in present-day commerce with special attention to northwestern Europe and the United States. Results published. (See p.4, item 9.)

Roy I. Wolfe

Born November 19, 1917

Education 1956: Ph.D., Toronto
1947: M.A., Toronto
1940: B.A., McMaster

Memberships Canadian Association of Geographers
Regional Science Association
International Peace Research Society
World Society for Ekistics

Experience

Present Appointment

Professor, Department of Geography, Faculty of Arts and Science, York University, 1968 to date.

Previous Appointments

1967–68

Associate Professor, Department of Geography, Faculty of Arts and Science, York University

1969–70

Special Lecturer, University of Toronto

1941–43

Science Teacher, High and Vocational School, Fort Frances, Ontario

Professional Offices

1969 to date

Member, Commission on Transport, International Geographical Union

1969 to date

Associate, Kates, Peat, Marwick & Company

1967 to date

Partner, R.I. Wolfe Associates

1952–67

Successively, statistician, planner, geographic advisor and research geographer, Department of Highways, Ontario

1945–47

Director of Visual Education, Veterans' Rehabilitation Institute (now Ryerson Institute of Technology), Toronto

1943–45

Canadian Army overseas

Sponsored Research

None

All present research done from consultantship, on location of new international airport for Metropolitan Toronto, on a systems model for predicting and planning tourism and outdoor recreation in Ontario, etc.

Fields of Interest

Transportation
Recreation

Experience with Graduate Instruction

1967 to date

York University: supervision of three M.A. theses

1960–61

University of Washington

Graduate seminars on invitation at numerous universities in Canada and the U.S.

Books and Monographs

Relation Between Agricultural Productivity and Rural Population Density in Ontario, Department of Highways, Ontario, 1958.

One Geographer's Role in Highway Planning, Department of Highways, Ontario, 1960.

A Highway Plan for the Hamilton-Wentworth Area (in part), Department of Highways, Ontario, May, 1961.

An Annotated Bibliography of the Geography of Transportation (with Beverly Hickock), Institute of Transportation and Traffic Engineering, University of California, Berkeley, Information Circular No. 29 (October, 1961).

Recreational Travel in the Niagara Region, Department of Highways, Ontario, 1962.

Transportation and Politics, Princeton, Van Nostrand, 1963.

A Theory of Recreational Highway Traffic, D.H.O. Report No. RR128, Department of Highways, Ontario, 1967.

"The Changing Patterns of Tourism in Ontario," chapter in centennial book, *Profiles of a Province*, Ontario Historical Society, Toronto, 1967, pp. 173–177.

"Economic Development," chapter in *Canada: A Geographical Interpretation*, edited by John Warkentin, Methuen, Toronto, 1968, pp. 187–228.

"Spatial Interaction in the Economic History of Canada," Chart included in above, and published separately by Methuen, 1968.

A Study of Canadian Statistics on Outdoor Recreation and Tourism (with J.B. Ellis), Dominion Bureau of Statistics, Ottawa, 1968.

Design for a province-wide Tourism and Outdoor Recreation Participation Study, Province of Ontario, Department of Tourism and Information, 1968.

A Use-Classification of Parks by Analysis of Extremes, D.H.O. Report No. 134, Department of Highways, Ontario, 1969.

Articles

"The Phylogeny of Digital Patterns in Man and Its Bearing on Racial Affinities: A Study in Human Ecology," *Human Biology*, Vol. 22, No. 1 (1950), 34–64.

"Summer Cottagers in Ontario," *Economic Geography*, Vol. 27, No. 1 (January, 1951) 10–32.

"Wasaga Beach: The Divorce from the Geographic Environment," *The Canadian Geographer*, No. 2 (1952), 57–65.

"Leisure: The Element of Choice," *Journal of Human Ecology*, Vol. 2, No. 6 (1952), 12 pp.

"Two New Classification Techniques," (with P.E. Wade and R.B. Truemner), Highway Research Board *Bulletin* No. 158, 1957.

"On Freedom, Freeways, and Flexibility: The Private Correspondence of Messrs. Wolfe and Mumford," *Journal*, American Institute of Planners, Vol. 27, No. 1 (February, 1961), 74–7.

"Contributions from Geography to Urban Transportation Research," Highway Research Board *Bulletin* No. 326 (January, 1962), 46–68.

"Transportation and Politics: The Example of Canada," *Annals*, Association of American Geographers, Vol. 52, No. 2 (June, 1962), 176–90.

Also published in *Politics and Geographic Relationships*, edited by W.A. Douglas Jackson. Englewood: Prentice-Hall, 1964, pp. 221–40.

Also distributed in Bobbs-Merril Reprint Series.

"Land Use and Transportation," requested for a Symposium on Land Use and Mapping Problems, May, 1962; *Canadian Geographer*, Vol. 7, No. 3 (1963), 148–9.

"Ontario Summer Resorts in the Nineteenth Century," *Ontario History*, Vol. 54, No. 3 (1962), 149–61.

"Geographic Aspects of Transportation Planning for the Rural-Urban Fringe," requested for a special issue, on geography in planning of *National Geographer* (India), Vol. 5 (1962), 67–79.

"Perspective on Outdoor Recreation: A Bibliographical Survey," *Geographical Review*, Vol. 54, No. 2 (1964), 203–38.

"The Key Elements of Outdoor Recreation," Chart published with above and available separately.

"Effect of Ribbon Development on Traffic Flow," *Traffic Quarterly*, Vol. 18, No. 1 (1964), 105–17.

"Nucleation on the Rural-Urban Fringe," requested for the Third Delos Symposium, 1965. *Ekistics*, Vol. 20, No. 119 (October, 1965), 228–31.

"About Cottages and Cottagers," *Landscape*, Vol. 15, No. 1 (Autumn, 1965), 6–8.

"Parameters of Recreational Travel in Ontario," *Proceedings*, Canadian Good Roads Association, 1965, pp. 235–61.

Also published as Report RB111, Department of Highways, Ontario, 1966. Awarded President's Medal, Canadian Good Roads Association, 1965.

"Recreational Travel: The New Migration," requested for First International Seminar in Ekistics and Human Settlements, Athens, July, 1965. *Ekistics*, Vol. 21, No. 123 (February, 1966), 117–23.

Also published in *The Canadian Geographer*, Vol. 10, No. 1 (1966), 1–14 and reprinted in retrospective issue of *Geographical Bulletin*, 1968, pp. 159–72.

"The Geography of Outdoor Recreation—A Dynamic Approach," *B.C. Geographical Series*, No. 8 (1967), 7–12.

Reviews

The Canadian Geographer, (in spanish) *Foro Internacional, International Journal*.

Forthcoming Publications

"Recreation Geography," chapter in book on *Methodology in Geography*, edited by John N. Jackson and James Forrester, Ryerson Press, Toronto.

"Recreation and Conservation in Mid-Canada," presented to Mid-Canada Development Corridor Conference, 1969.

Discussion of Larry W. Tombaugh, *Vacation Homes, Environmental Preferences, and Spatial Behavior*, paper presented at the 1969 Meeting of the American Association for the Advancement of Science.

Proposal for

**THE HALTON-WENTWORTH
WATERFRONT STUDY**

Acres Consulting Services Limited

Project Planning Associates Limited

OUR EXPERIENCE

PPAL

Kuwait, Kuwait
Client: Government of Kuwait
Ministry of Public Works
Waterfront Development of Greater Kuwait
1961 to date

The original assignment was awarded to the firm by the Government of Kuwait on the basis of the firm being selected through an international design competition for the project. Initially, a feasibility study and documented master plan was prepared for the waterfront, establishing the relocation of the Dhow Harbour and coastal shipping port, reclaiming the tidal foreshore to make provision for scenic coastal highway, laying out recreational and beach areas and parks on this foreshore and providing for a suitable civic setting for the Palace representing the Seat of the Government of Kuwait.

The interdisciplinary team was then assigned to carry out the detailed design for the complete waterfront. This involved traffic studies for the central city within the context of the metropolitan area, a study of shoreline and underwater conditions with a detailed investigation of geological and hydraulic characteristics. A detailed design was prepared for each of the components of the master plan along with cost estimates and staging programmes.

Thereafter the Government of Kuwait extended the scope of the waterfront development project from the initial ten kilometres to a total expanded length of forty-six kilometres. Again the firm was asked to prepare a feasibility study and outline concept for this Greater Waterfront of Kuwait dovetailed with the master plan of the central waterfront region and included a concept of land reclamation for areas of agricultural production, an international exposition site, additional marina areas and route for a new coastal highway as well as functional design of the highways required in the first stage.



Kuwait Waterfront Development — Model

The Government of Kuwait has begun a program of implementing key elements identified in the above concept plans for the Greater Kuwait Waterfront. In the initial phase of this program the firm was commissioned to undertake the design of the new Dhow Harbour, including all the back-up land facilities and buildings associated with this harbour; two ferry terminals which would provide both a conventional ferry boat service link as well as a hovercraft service link between the mainland of Kuwait and the Island of Failaka some twenty kilometres offshore; and, four sea clubs and marinas each of which would be capable of providing small craft mooring facilities for approximately two hundred boats. In this work the firm first prepared the preliminary designs for each of these seven projects and then proceeded to the preparation of the detailed construction drawings, specifications and contract documents for international tender for both the marine civil engineering works as well as all the buildings, roads and infrastructure items involved in the projects.

The area represented by the Dhow Harbour development is approximately one square mile and is designed to accommodate up to 250 dhows (cargo vessels), cement barges and fishing vessels. Included in the harbour facilities are all the buildings relating to port and customs administration, health and quarantine depots, cargo terminal facilities, passenger

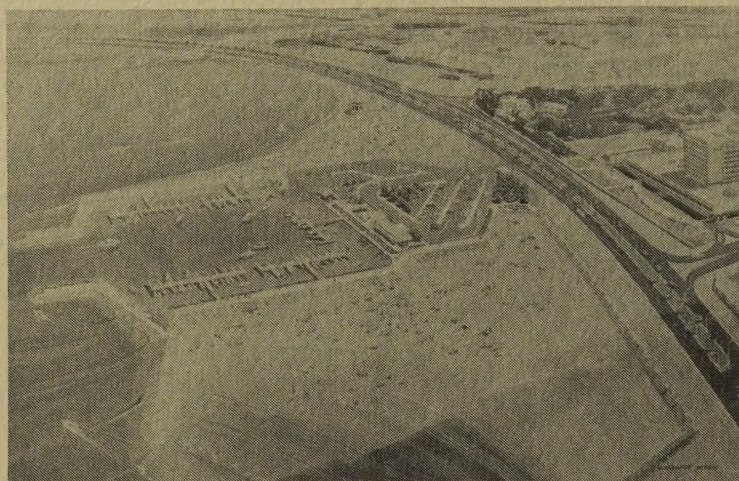
terminal, fire station and police station, transit sheds, light industrial facilities including a fish market and plant, service centres including restaurants, parking areas and landscape development.

The ferry terminals in addition to providing club house, swimming pool and recreational facilities for the mooring of small private pleasure boats include the port facilities relating to harbour and custom administration, health and quarantine depots, cargo and passenger terminal facilities and maintenance facilities for the ferry boats and hovercraft.

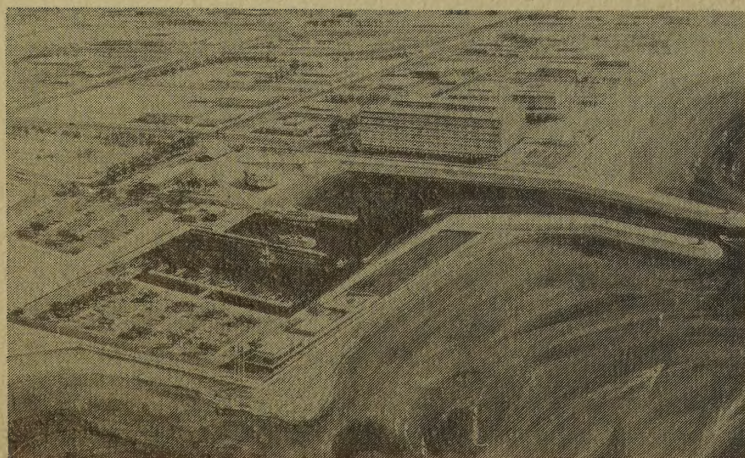
The sea clubs provide club house buildings, swimming pools and related recreational facilities oriented both to the use of the marina as well as the use of adjacent man-made beaches.

These projects are presently out to international tenders and the program has an estimated construction value of approximately \$25 million.

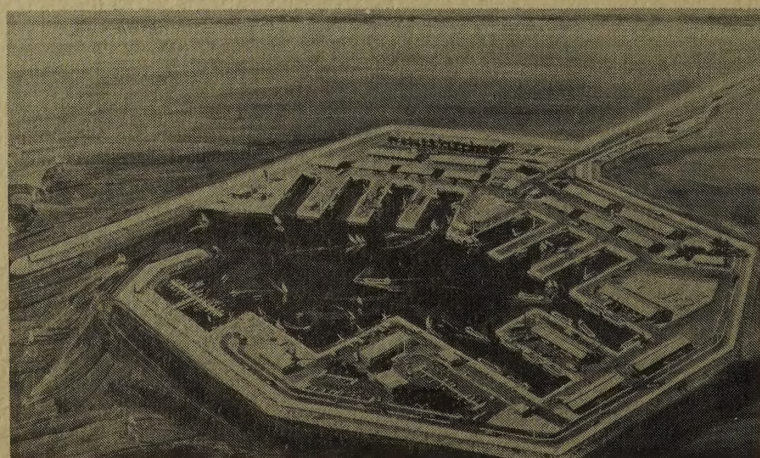
The firm has also been commissioned to provide resident on-site management and supervision of the construction phase of these projects.



Hilton Sea Club — Kuwait



Ras Al Ardh Ferry Terminal



Al Doha Dhow Harbour

PPAL

Deuba, Fiji, South Pacific
 Client: Pacific Hotels and Developments Limited
 Master Plan and Detailed Design of Phase I for
 Deuba Townsite Project
 1969-1970

The company was commissioned to examine the development potential and prepare a master plan and detailed design for 7,000 acres of land, 30 miles to the west of Suva on the South coast of Fiji, with the view to its becoming a growth centre for the expanding tourist industry in Fiji and as the hub for the regional, social and agricultural reconstruction of Fiji in the delta and coastal lands of the Navua River and its tributaries.

An interdisciplinary team of the firm's planners, transportation and municipal engineers, coastal and marine experts and urban designers examined the area within the context of Fiji's overall climatic and land capability character and laid out a community and growth centre to accommodate shopping, educational and civic facilities, an arterial road network, a coastal beach, and an internal open space system related to the transverse mountain ridges and valleys of the streams penetrating the area.

A dredging and land reclamation program was prepared to permit effective internal drainage and penetration of the area by canals and bodies of water for use of pleasure craft. The development is now under construction.

ACRES

Baie Comeau, Quebec
 Client: Quebec North Shore
 Paper Company
 Shore Erosion Study
 1965

1287

Study of the nature and possible future extent of the erosion by waves of the reservoir shore slopes of the Manicouagan 2 Hydroelectric Power Development.

ACRES

Newcastle, New Brunswick
 Client: Government of Canada
 Harbour Improvements
 1966

1376

Revision and extension of an existing ocean wharf.

ACRES

Toronto, Ontario
 Client: Guildwood Village Limited
 Shore Protection
 1962

922

Specifications for eight timber groins (50 to 100 feet long) for the protection of a section of the north shore of Lake Ontario where high bluffs verge on a narrow beach.

PPAL

Oakville
 Client: Oakville Yacht Squadron
 Harbour Study
 1961

A master plan for the Oakville Harbour was commissioned by the O.Y.S. in order to show how the Yacht Squadron could expand its facilities and still provide ample space for both public and private marinas. The plan includes facilities for public agencies and sea scouts including office space and an indoor gymnasium-auditorium complex.

To arrive at a final design, the entire harbour entrance area was studied to provide the maximum number of boat moorings while accommodating land needs such as landscaped open spaces, parking and storage. The firm was commissioned to prepare a master plan for 16 Mile Creek in 1961 which provided an ideal regional basis for the development of the Yacht Squadron and harbour spaces. The attempt has been to view this area in context of the total harbour in order to create a strong water entrance for the city. To accomplish these goals a master plan was developed that was capable of being implemented in four stages.

ACRES

Welland Canal
 Thorold, Ontario
 Client: Industrial Docks &
 Supplies Limited
 Docking Facility
 1967

1350

Report on a proposed two stage expansion of an existing docking facility. Two prefabricated type, single-storey warehouses.

PPAL

ACRES

Monaco, Southern France
Client: Triad Corporation,
Beirut, Lebanon
Feasibility Study for tourist Facilities
1967 - 1968

The Principality of Monaco covers only 620 acres and the object of this feasibility study was to ascertain how manmade marine-oriented extensions could increase tourist trade substantially without spoiling the natural beauty of Monaco and Monte Carlo.

The study recommended a multi-million dollar 15-year investment creating large artificial offshore islands containing deepwater berths for cruise ships, hotels, apartments, entertainment facilities duty-free shopping, etc., and is at present in the pre-engineering design phase. It includes macro-Analysis of all tourist facilities on the Mediterranean coasts of France, Spain and Italy.

ACRES

Shippegan, New Brunswick
Client: Government of Canada
Breakwater
1966

1375

Reconstruction of 750 feet of the west breakwater at the entrance to Shippegan Gully.

ACRES

Baie Comeau, Quebec
Client: Quebec North Shore
Paper Company
Land Reclamation
St. Lawrence River
1962

912

Establishment by dredge fill of 10 acres of new land for warehousing and cargo handling facilities.

Winnipeg, Manitoba
Client: Province of Manitoba
Department of Agriculture
and Conservation
Water Control and
Conservation Branch
Floodway Control Works
1966

940

Engineering and supervision of construction for the inlet and outlet control works for the Red River Floodway.

ACRES

Parry Sound, Ontario
Client: Falconbridge Nickel
Mines Limited
Wharf Study
1967

1545

Report on a proposed wharf for the berthing of ocean vessels having a maximum length of 735 feet.

ACRES

Toronto, Ontario
Client: Metropolitan Toronto
Planning Board
Development Study
1970

2376

Development study of the Central Portion of the Scarborough sector of the Metropolitan Toronto Waterfront, Toronto, Ontario, including analysis of erosion and erosion control, recreational uses and design of facilities.

ACRES

Ulsan, South Korea
Client: Maritimecor S.A.,
Zurich, Switzerland and
Hyun Dai Construction
Company, South Korea
Dry Dock and Shipyard
Feasibility Study
1971

2625

Study of the technical and economic feasibility of the development of dry dock and shipyard facilities for the construction of supertankers (to 300,000 dwt) at the rate of five vessels per year.

ACRES

Saint John, New Brunswick
Client: Saint John
Shipbuilding and
Dry Dock Company
Limited
Shipyard Facilities
Expansion Studies
1970

2476

Engineering evaluations of the revisions and expansion required to increase the vessel size capability of an existing shipbuilding and repair facility from 80,000 to 500,000 dead weight tons. The study examined various combinations of the following possibilities:

Expansion of an existing repair dock — two alternative sizes and arrangements

Construction of a new shipbuilding dock — two alternative locations

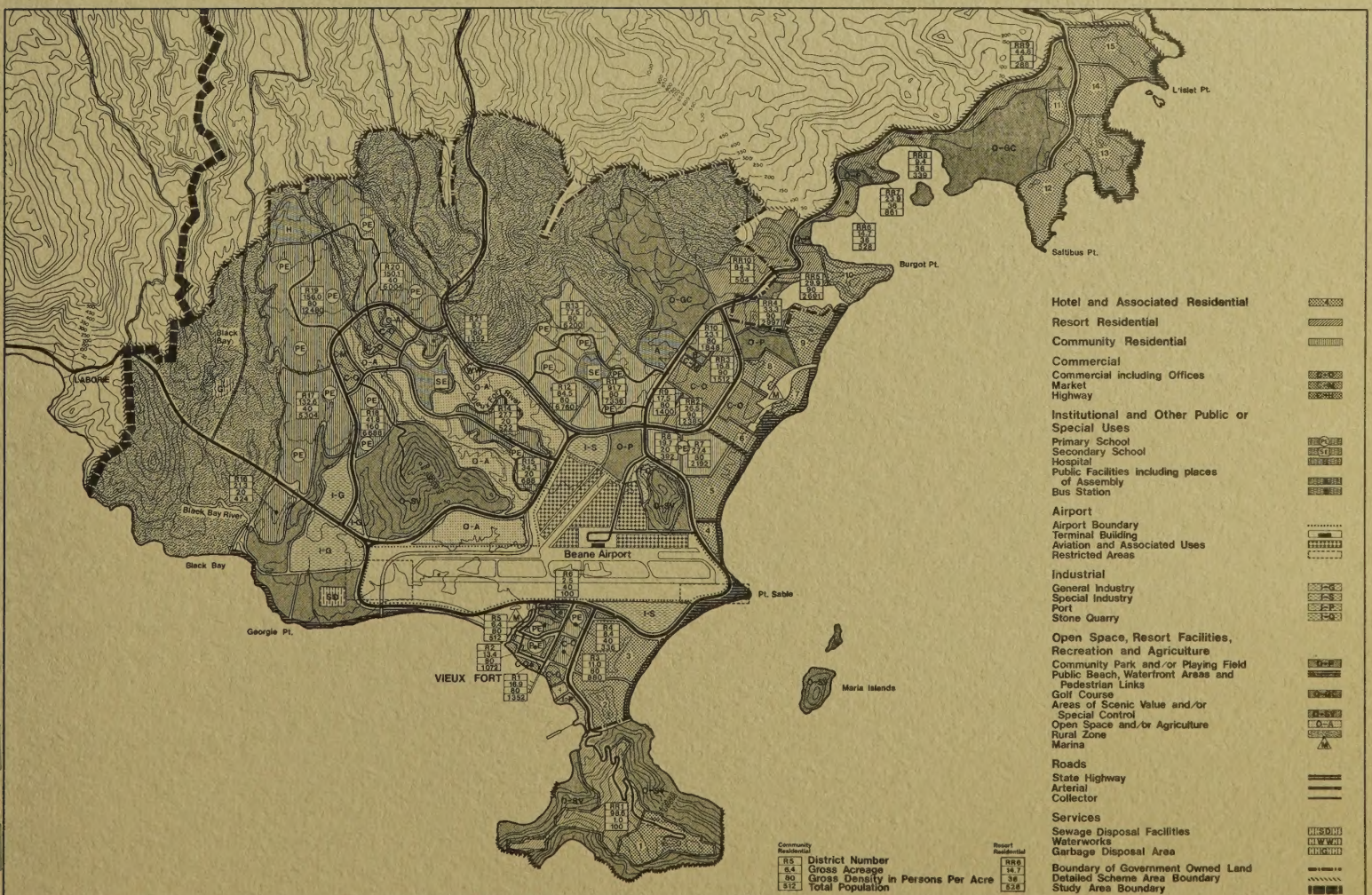
Construction of a new steel handling and fabricating facility — two alternative annual capacities

Island of St. Lucia, West Indies
 Client: Government of St. Lucia
 Canadian International Development Agency
 (CIDA)

Tourist-Oriented Master Development Plan
 1968-1967

The Canadian International Development Agency, as part of the Canadian Aid Program, commissioned the company to prepare a tourist-oriented master development plan for the southern tip of the Island of St. Lucia. This study was predicated by the decision of the Canadian Government to assist St. Lucia in the expansion and improvement of an existing airport in the area.

The detailed study area comprised approximately 5,000 acres bounded on two sides by the Atlantic Ocean and Caribbean Sea, and on the third by a row of relatively steep hills. The location of the area, within easy flying time from both the North and South American continents is excellent in terms of future tourist development potential.



Province of
 Prince Edward Island
 Client: Government of Prince Edward Island
 Department of Agriculture
 Agriculture Rehabilitation and
 Development Administration
 Prince Edward Island
 Development Program
 1965

1245 & 1272

Report on the first phase of a study leading to the formulation of a Development Program for the Province.

The report is in the form of an appraisal of the present level of the development of the Province, the requirements of a development program, the extent of the work required to formulate a suitable program, and the possible methods of securing the coordinated execution of the program.

The appraisal assumes that the development program will include:

A land use plan to promote the most profitable use of land for agriculture, forestry, recreation, and other purposes

Feasibility studies for the most promising of the industries based on resources, and for various related secondary industries

A services development plan to promote the orderly establishment and extension of electric power, water supply, pollution control, transportation, and education facilities, with particular reference to the rural situation

A plan covering the establishment of a training program and associated information service to promote the development of human potentials

A financial program to secure financing for the proposed development undertakings

An implementation program utilizing existing institutions and new agencies to secure the effective realization of the adopted program

Preparation of a Development Program for Prince Edward Island.

Mactaquac Reservoir Region
 New Brunswick
 Client: Federal-Provincial
 Agriculture Rehabilitation
 And Development
 Administration
 Regional Development Plan
 1965

1158

Preparation of an integrated regional development plan for the beneficial use of all resources on a multipurpose basis. The work included the classification of land for its forestry and recreational capabilities, a woodlot inventory, a forestry development program, proposals for a regional park system, etc.

PPAL

Mississauga, Ontario, Canada
Client: Markborough Properties Limited
Master Plan and Detailed Design for
Meadowvale New Town
1968 to date

A Master Plan Concept for a 3,500 acre tract in the Town of Mississauga, just west of Metropolitan Toronto, was prepared for a private developer. It provides for two new residential communities and the extension of the existing Town of Streetsville to accommodate an ultimate population of some 90,000 people, as well as almost 400 acres of industrial land and an extensive system of linked recreational open spaces, emanating from the adjacent Credit River Valley.

An intensive analysis of population, market conditions, development trends and costs was prepared to provide the planning and design parameters. The socio-economic forecasts made demanded a high proportion of medium and high density housing and the provision of significant amounts of office space and high quality, medium density industrial land. The site's location relative to Metropolitan Toronto and the mobility of urban workers required the development of a very high standard of arterial streets, accommodating great volumes of local and regional traffic in and around the new town.

The project required the assignment of a permanent team resident at the project site. This interdisciplinary team, composed of a head planner, transportation and traffic engineer, municipal servicing engineer, city and regional

planner, urban designer, economist, landscape architect and a project manager, has worked closely with agencies such as the Ontario Water Resources Commission and the Credit Valley Conservation Authority to ensure the appropriate attachment of the project to major trunk servicing patterns in the Credit Valley watershed and regional infra-structure such as the existing and proposed super highway system connecting Metropolitan Toronto with the Great Lakes Seaway Megalopolitan Corridor.

Further they are charged with the responsibility of the production of detailed plans of subdivision, the co-ordination of urban design and inter-relationship of buildings and building complexes, the layout and design of the parks and recreational systems, the detailed design of roads and underground services and research into new housing forms and the introduction of the diversification of dwelling and other building types.

Throughout the process analysis of regional economic factors and market analyses together with analysis of existing and future social conditions have given the guidelines for detailed planning and design.

The process includes detailed master planning and layout design of the industrial lands in accordance with ongoing requirements of tenants and contractual obligations of Markborough Properties Industrial Division.



Dar es Salaam, Tanzania
Client: Government of
the United Republic of Tanzania
Master Plan
1965–1968

The project required the preparation of a master development plan for Dar es Salaam and the capital region of Tanzania.

The comprehensive master plan prepared for a future population of 2.9 million expected to reside in a 400 square mile capital region development area, includes proposed land use, community structure, transportation and servicing plans. A year 2000 concept was put forward which delineated an urban growth system for the city and its future metropolitan area.

Within the growth concept, a 1989 plan was prepared with policies and recommendations for implementation. The plans and report brought together in one document the results of seven technical supplements produced to provide detailed understanding of planning studies, transportation and traffic, municipal infrastructure, city form and environment, physiographic studies, economic evaluation and capital works program.

The industrial areas shown in the master plan covered a total of 6,930 acres and made provision for 3 warehousing facilities, 8 light industrial areas and 6 heavy industrial areas.

A detailed sector plan was produced for the Kigamboni industrial area covering 1,100 acres which contained an existing refinery. This area is immediately adjacent to major deep water port facilities and had rail access tied in to the proposed Tan-Zam railroad system.



PPAL

Malvern New Town, Ontario, Canada

Client: A partnership of the Government of Canada and the Government of the Province of Ontario as represented by

Central Mortgage and Housing Corporation

Master Plan for Development and

Detailed Design of Phase I

1968–1970

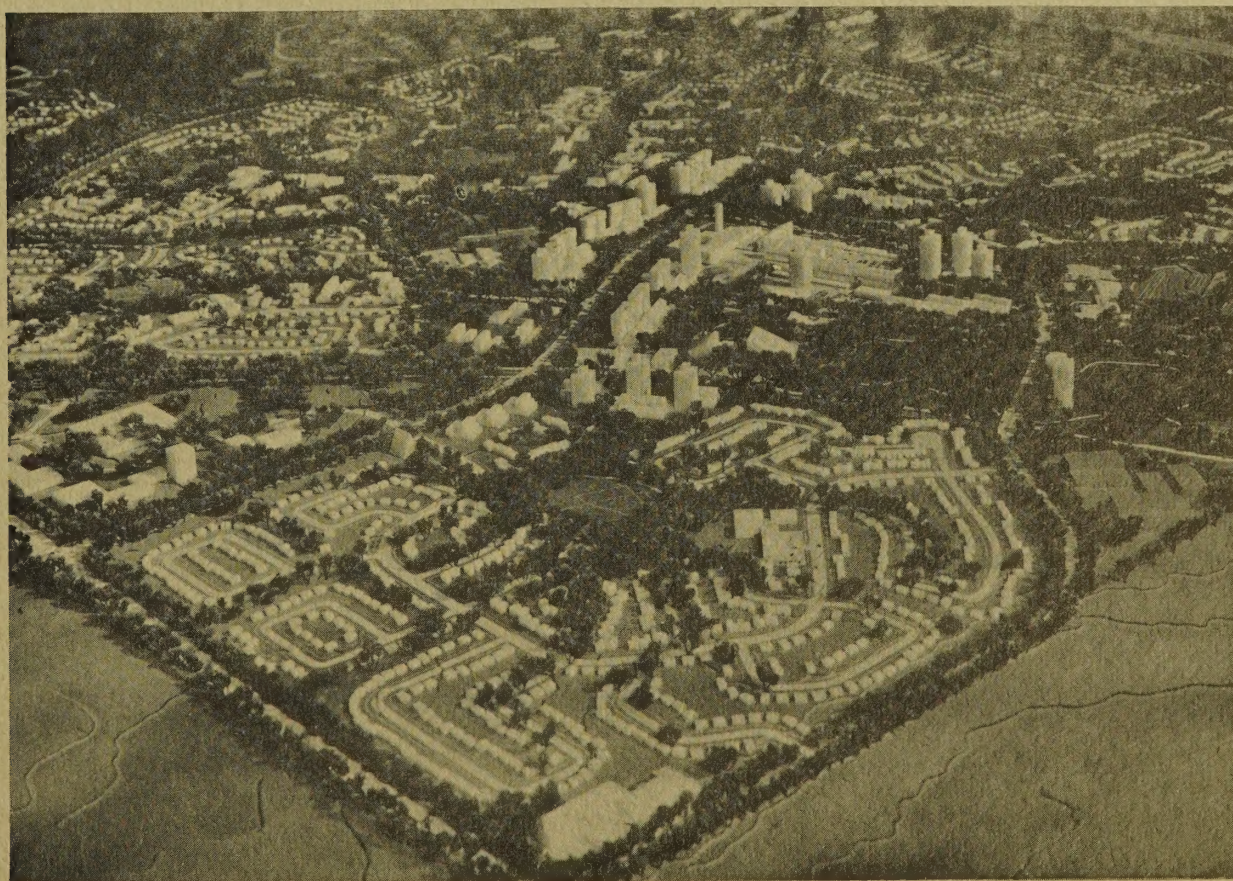
The planning of this community was a continuation of the original assignment for the Federal-Provincial partnership in 1957 at which time the firm undertook a feasibility study for the land assembly within the context of metropolitan and regional, existing and proposed infrastructure. It was the firm's recommendation that the land assembly should be held in the form of land bank with the implementation to occur after ten years.

Preparation of Master Plan for recreational development of a 1350-acre site in connection with flood control development. The study involved regional analysis in terms of recreation,

traffic and urban growth, preparation of land use study, master development plan, services, staging, cost estimates and report. Facilities for picnicking, swimming, boating, fishing, hiking, day camps and winter activities are planned for up to 18,000 people at one time.

The present assignment has made the firm responsible for the preparation of the master plan and Phase I design on 1,700 acres of land for a population of 57,000 persons in a single community. The community will contain an urban core with its shopping, recreational and institutional facilities, a cross-section of high and low density housing with a wide diversity of housing types. This will be combined with a park and open space system, network of primary and secondary educational facilities and an employment sub-centre with an office and industrial complex.

A high degree of continuous liaison with Federal, Provincial and Municipal agencies was maintained. The planning and design criteria were based on detailed policies and standards established in conjunction with these agencies pertaining to precisely defined requirements regarding the house type mix, school sizes and locations, neighbourhood characteristics, traffic patterns and municipal services.



ACRES

Mactaquac Region,
New Brunswick
Client: The Community
Improvement Corporation
Development Implementation
1965

1333

Report reviewing the origin, nature and extend of the basic development plan for the Mactaquac Region and summarizing the nature, scheduling and estimated costs of the activities that must be undertaken if the development plan is to be executed in full. The report outlines the work done to date and discusses various problems of co-ordination and financing associated with future activities. The report will serve as the basic reference for discussions and agreements on the further implementation of the development plan.

ACRES

St. Andrew's,
New Brunswick
Client: New Brunswick
Development Corporation
Industrial Park Site
Service Systems
1966 – 1968

1366

Planning, engineering, negotiation and management of contracts, management of construction capital, and management and supervision of construction for the development of the site service systems of Champlain Industrial Park. This included:

- a fresh water supply system,
- a seawater supply and return system,
- a sanitary sewerage system,
- a storm drainage system,
- an electric power distribution system, and
- access roads and provisions for railway sidings.

PPAL

Montreal, Canada
Client: Canadian Corporation for the 1967 World
Exhibition
Site Selection Studies
Master Plan Preparation
Detailed Design of International Pavilion Sections
1962-1967

In 1962, principals of the firm assisted in the formulation of the theme of Expo 67 "Terre des Hommes." In 1963, the firm was appointed, in association with a Montreal engineering firm, to undertake studies of a number of alternative sites in the metropolitan region of Montreal, to effectively determine the site most suitable for the establishment of an international exposition. The team advised on the selection of the river and riverfront site.

That same year the company was asked to provide a team to work in association with counterpart personnel of the Canadian Corporation for the 1967 World Exhibition to produce a master plan from which the project could be most

suitably implemented. The plan was produced and delineated the basic land form, location of canals and water areas, the location of circulation and transportation systems, open spaces and promenades, and sites for international exhibitors and theme pavilions. The team undertook the master plan work on the premises of the Canadian Corporation for the 1967 World Exhibition alongside counterpart personnel.

In 1964, the Company was commissioned to undertake the detailed design of the two islands embracing the international pavilion sections, which required close association with counterpart personnel in the Corporation's offices and direct negotiation with commissioners general and designers of pavilions for each of the 70 nations participating.

Through 1964-65-66 and 67 detailed working drawings were prepared for the site. With the ongoing program for site development, the company was requested to provide one of its principals' full time on the staff of the Corporation and assume responsibility for site development and maintenance program during the term of the exposition.



West Prince County, Prince Edward Island
 Client: Department of Tourist Development
 Government of Prince Edward Island
 Tourist and Recreation Plan
 1970

This study appraised the export tourist potentials of the western part of Prince Edward Island and presented a plan for increasing tourist demand and spending.

Specific investment locations were identified and projects were scheduled for the period 1971 to 1975. Capital costs, operating returns, new employment and increased tourist spending were estimated; development costs were apportioned between the public and private sectors.

Methods were recommended for stimulating tourist activity through improved information services and greater local participation in the planning and implementation of projects.

The recommendations were progressively developed throughout the study by means of group meetings with elected and appointed officials and citizens.

Ontario
 Client: Department of Tourism and Information
 Government of Ontario
 Design of a Province-wide Study of Tourism and
 Outdoor Recreation, Ontario (in association with
 Kates, Peat, Marwick and Company)
 1968-69

This project developed the methods, timing and personnel requirements for preparing a Province of Ontario recreation and tourism plan. It recommended techniques for developing and applying mathematical models to forecast the future recreation requirements of a wide variety of interests and social groups.

The assignment was concerned with providing demand and supply information upon which long-range recreation and tourism goals could be based, and from which detailed development plans could be prepared.

Southern Ontario
 Client: Department of Tourism and Information
 Government of Ontario
 Concepts for the Development of Tourism in
 Southern Ontario
 1969-70

This project developed priorities, implementation policies and investment guidelines for the expansion of tourism in Southern Ontario during 1971 to 1975.

Existing and potential attractions of major tourist significance were identified as focal points and centres of secondary importance were recommended as corridors for support investment.

Priorities were established on the basis of: capability for year-round operation, availability of markets and relationships among interdependent investment locations.

Methods of involving local tourist groups in more detailed analysis and implementation were described. A typical recreation corridor was analysed by the consultants and a general development plan for a 600 square mile area was formulated showing recommended areas for: campgrounds, cottage areas, points of interest, service locations, information centres, accommodation and restaurant centres, roads and airports.

Dominion of Canada
 Client: Canadian Tourist Association
 Tourist Analysis
 1969

Analysis of demand trends for tourist accommodation in Canada.

PPAL

Wasaga Beach, Ontario, Canada

Client: Government of the Province of Ontario
as represented by joint committee of
Department of Lands and Forests
Department of Highways
Department of Tourism and Information
Department of Municipal Affairs

Master Plan and Phase I Development Plans for
Rural Reconstruction, Tourist Development and
Shoreline Renewal
1966–1968

Wasaga Beach is one of Canada's largest fresh water beaches and is located adjacent to its greatest market area, Metropolitan Toronto. The area has previously undergone uncontrolled development related to recreational activities primarily oriented around the week-end automobile traffic. The project required that a comprehensive study of the region be undertaken such that recommendations as to a redevelopment program could be established, taking into account the future requirements of both visitors and local residents.

The interdisciplinary team appointed to the task examined the physiographic character of the area, made thorough investigation of the community development, municipal financing and local government structure of municipalities in the area. In collaboration with the government's Department of Highways the future development was related to the planning of a major super highway connecting the region with Metropolitan Toronto and other urban centres.

The report illustrated graphically and documented the way in which the government could carry out in stages, the return of the beach to its original state, its acquisition by the Province for a provincial park, the restructuring of the existing uncontrolled communities into satisfactory physical form, the location of community and touristic centres for shopping and business, the development of internal recreational lands and conservation areas related to the drainage and water shed patterns, the introduction of suitable arterial roads and municipal services, and the location of by-pass and collector roads. Cost estimates and staging were presented along with a program of the new form of local government for the sub-region including required structure, new legislation, administrative and planning controls.

PPAL

Kingston, Ontario

Client: City of Kingston
Waterfront Study
1971

Four waterfront sites in the City of Kingston were identified and detailed plans were prepared and costed in the process of determining the most feasible location for an Olympic-type sailing centre.

The City of Kingston has gained international stature for its capability to host C.O.R.K., Canadian Olympic (Training) Regatta at Kingston. Project Planning Associates Limited were retained by the City to prepare a report in support of its bid to host the 1976 Olympic sailing events. This study, completed in 1971, evaluated the environmental, cultural and historic advantages of each site; the relative direct and indirect benefits that would accrue to the City from hosting the events; and the capital costs for harbour, shore and community support facilities required to meet the operational standards of the Olympic Games.

The selected site, Portsmouth Harbour, is surrounded by early nineteenth century lime stone structures for which Kingston is famed. Preliminary design plans of the sailing centre incorporates all important existing structures in the scheme. New structures are envisaged as complementary to the old village of Portsmouth in massing and in texture. Public facilities and open spaces are provided in the plan so that the centre will serve a variety of community purposes after 1976.

PPAL

Canadian Shield, Bala and District
of Muskoka, Ontario

Client: Travel Research Branch, Department
of Tourism and Information/A.R.D.A.
Branch, Department of Agriculture
and Food, Government of Ontario
Recreation and Community Study
1968–69

This study analysed the factors which influence the development of small communities whose economy is largely based on tourism and summer cottage trade in the Canadian Shield portion of Southern Ontario. Various community types were defined in terms of: the type of visitor they will attract, realistic limits of development, environmental compatibility, and the components needed for stable, year-round communities.

Valley of the Upper St. Lawrence River, Ontario, Canada
 Client: Ontario St. Lawrence Development Commission
 Government of the Province of Ontario
 Master Plan and Detailed Design and Implementation
 Services for Regional and Local Development of
 River Valley

In 1957 the Government of the Province of Ontario recognized the need for a comprehensive plan, for the lands which had been acquired by the Government for the proposed St. Lawrence Deep Water Way and St. Lawrence Power Development.

The company was commissioned to study and analyze the 150 mile length of the north shore of the St. Lawrence River, including the municipalities between Kingston and Cornwall. Economic and social analyses were made to determine the soundest form of land utilization of the areas either held or expected to be acquired by the Ontario St. Lawrence Development Commission.

A plan was prepared for long term development of the region and detailed sector plans were prepared for the five selected contiguous sectors. The Power Pool Sector between Cardinal and Cornwall required the most penetrating examination.

Because of the inundation of the major highway between Toronto and Montreal and a number of existing communities it was necessary to determine the best inter-relationship between the new relocated communities and the rural and recreational lands. A physical plan for development and cost estimates were prepared for a 20-year period.

Following the preparation of the long range master plan detailed plans for the restoration of an early Ontario community, the layout of parks, marina areas and service centres were prepared.

Oshawa Creek Valley
 Client: City of Oshawa
 Master Plan for Development
 of Creek Valley

A master plan was produced for the City of Oshawa indicating the natural features of the creek valley which should be preserved. It also outlined those areas of marginal importance which would require additional landscape treatment, and areas suitable for recreational uses complementing similar areas of adjoining neighbourhoods. Park land acquisition policies were recommended along with staging plans and cost estimates.

Oakville
 Client: Town of Oakville
 Master Plan of 16 Mile Creek
 1962

The firm was commissioned by the Corporation of the Town of Oakville to prepare a master plan for the 16 Mile Creek. With the increasing growth of Oakville the redevelopment of the creek was felt to be desirable to eliminate its backyard, left over feeling. A plan with positive recommendations was required to establish the overall concept, list recreation uses and recognize both functional and flood-plain requirements. On site inventories of existing landscape features and their conditions were made along with an assessment of the communities recreation needs. As a result of these surveys recommendations on the location of boating facilities, various types of park and recreation uses and planting themes were included on the master plan. Cost estimates were prepared along with staging recommendations.

Toronto
 Client: Ontario Housing Corporation
 Master Plan for Community
 Recreational Development
 1970 - present

REGENT PARK COMMUNITY DEVELOPMENT PLAN:

The firm has been involved with the Ontario Housing Corporation in assessing the community requirements of Regent Park. Through intensive, on-going community meetings a design facilities program was established reflecting the needs of the people. An overall master plan was produced with development priority recommendations indicated on a staged basis. The first stage consisting of ice rinks, swimming pool, change houses, sports fields, playgrounds and landscaping is now under construction.

PPAL

Pickering, Ontario
 Client: Ontario Hydro Commission
 Landscape Development of the Lands
 and Waterfront of Power Stations
 1971 - present

Over the past year the firm has been responsible for the landscape planning and design of major power generating stations, local transformer substations, and individual building sites for the Ontario Hydroelectric Commission. The master plans for the Pickering, Nanticoke and Bruce stations have shown how these major facilities can be integrated into the landscape recognizing the importance of recreation, tourism and open space amenities. Power stations require extensive water frontage and our planning studies have recognized the need to integrate these facilities into comprehensive waterfront plans.

The preparation of a landscape plan requires a thorough understanding of the numerous and complex operational requirements of these large industrial facilities. Recognition of staging and expansion needs further complicate the overall process. Through comprehensive landscape planning economics have been realized by predetermining landform locations for the piling of excavated material, by isolating and preserving important landscape features, and by planting reforestation size trees at the early stages of a project allowing them a chance to mature as the construction proceeds.

Presently, as part of phase one of the Pickering Nuclear Station plan, a park and wildlife sanctuary are being constructed which will serve to retain the balance of the existing marsh eco-system while providing space for the passive recreation needs of the surrounding communities. Regional planning studies, followed by land planning studies precede design which upon reaching the construction stage results in the fulfilment of planning.

Planting, earth forms and grading, lighting, water elements, special landscape features, fencing and signage are carefully considered as part of the final design.

ACRES

Saint John, New Brunswick
 Client: City of Saint John
 Development Plan
 1966

1422

Preparation of a development plan for Rockwood Park.

PPAL

Welland Canal Relocation
 Client: Saint Lawrence Seaway Authority
 1968 to date

As landscape consultants to the SLSA we have worked closely with their engineers to evolve a master plan for the 10 miles of the elevated Welland Canal.

Extensive soil and water studies were prepared prior to initiating grading plans for 64,000,000 cu. yds. of excavated earth fill. The grading of the project has been virtually completed and the planting program begun. Ultimately over 2,000,000 trees will be planted thereby restoring the new land into a useable multi-use recreation area. Linked into the Niagara Parks system, it will become a major contribution to the recreation spaces of the peninsula. We have proposed that the old canals be retained as historic monuments which will cater to tourists and residents alike while preserving some of our cultural heritage.

PPAL

Recreation Study West Shore of Lake Winnipeg
 Client: Department of Industry and Commerce
 Government of Manitoba, Winnipeg, Manitoba
 1965-1966

The study recommended that the target area, the west shore of Lake Winnipeg, which was either neglected and/or under-developed, be transformed into a first class resort area both for the benefit of Winnipeg citizens and visitors, this to be fitted within the general requirements of the Manitoba Government development policies.

The analysis covered existing physical elements and restrictions, the availability of recreational facilities, existing accommodation, commercial development housing and summer cottages, industrial patterns, summer camps, and education.

The development plan, which clearly indicated both capital investment and expected returns, analyzed population trends and projected future population, traffic networks, services and land ownership. It made specific recommendations in areas of conservation, recreation, overall planning, highways and education.

Grand Lake Development
Area, New Brunswick
Client: Government of New Brunswick
Department of Natural
Resources
Recreation and Tourism Study
1969

1985

Study of the recreation and tourism potential of the Grand Lake Development Area. The study was undertaken in two sections:

Assessment of the recreation and tourism potential and review of various proposals for development and formulation of a development plan.

Assessment of the economic impact of the proposed development and analyses of the feasibility of the project.

ACRES

Maritime Provinces
 Client: Government of Canada
 Economic and Population
 Growth Study
 1965

1000
 (Co-authors)

The Company is one of three consulting engineering organizations that jointly as Northumberland Consultants Limited is providing the planning, design and construction supervision services for the proposed crossing (approximately 9 miles).

Phase 1 — A report (85 pages) on the feasibility of 14 different schemes for the form of the crossing.

Phase 2 — A report (156 pages, 54 plates) on the detailed study of the engineering aspects of the alternative designs with the recommendation that the crossing, whether as a highway only or as a highway combined with a railway, be constructed as a combination of a rockfill causeway carrying an elevated roadway, a bridge, and a concrete tunnel below a navigation channel with the initial work providing two traffic lanes but arranged for a future widening to four lanes. The report incorporates the results of extensive model studies of the possible effects of ice, wave, and tidal action on the proposed structures.

Phase 3 — Preparation of construction designs and contract documents for the causeway as recommended in the report. The structure will be a combined highway and railway crossing.

Phase 4 — Construction (Scheduled to begin January 1966).

ACRES

Saint John, New Brunswick
 Client: Government of New Brunswick
 Department of Public Works
 Bridge Study
 1966

1393

Participation, as a member of the Joint Federal-Provincial Study Committee, in studies of the location and approach routes of the proposed harbour bridge throughway complex in Saint John, New Brunswick.

PPAL

St. Clair Parkway Recreational Master Plan
 Client: St. Clair Parkway Commission,
 Sarnia, Ontario

The study recommended that the potential of the Parkway within its Great Lakes setting was considerable; that provided the problems were faced in a practical manner, the entire water-oriented area from Sarnia south from Lake Huron to Lake St. Clair and including Chatham could become a first class resort area. This parkway is interwoven throughout its entire length with the major petro-chemical and associated industries of Southern Ontario.

The report envisaged an ideal mix of industrial residential, commercial and recreational outlets together with population distributions and projections. In the recreational context the study broke down the area under review into general recreational areas: parking, picnicing, camping, riding and nature trails, and a series of secondary recreational units.

The entire study was predicated on the recommendation that the existing highway be replaced by one further inland, and that the existing highway become the spine of the overall development.

ACRES

Brazil
 Client: Government of Brazil
 Airport Study
 1969

1916

Reports on the requirements, locations and development of international airport facilities in Brazil.

ACRES

Welland, Ontario
 Client: City of Welland
 Traffic Study
 1965 & 1967

1107 & 1405

Report on the objectives, nature, extent and cost of a traffic study for the City of Welland, Ontario.

ACRES

Hamilton, Ontario
Client: McMaster University
Traffic Study
1966

1388

Report on a study of the effects that a proposed expansion of the main campus of McMaster University, Hamilton, Ontario, would have on traffic within the campus and the adjacent areas of the city.

ACRES

Niagara Falls
Client: City of Niagara Falls
Transportation Study
1963

918

Report on the present traffic conditions and the future traffic requirements of the Niagara Falls Planning Area, and on the orderly development of transportation facilities.

ACRES

St. Catharines, Ontario
Client: Niagara District Regional
Airport Commission
Development Plan
1965

1223

Report on a development plan for the Niagara District Regional Airport, St. Catharines, Ontario.

ACRES

Calgary, Alberta
Client: Government of Canada
Department of Transport
Civil Aviation Branch
International Airport
Study
1968

1546

Reports on interim and master plans for the development of the Calgary International Airport, Calgary, Alberta.

ACRES

Oakville, Ontario
 Client: Town of Oakville
 Urban Transit Study
 1971

2828

Assessment of the demand for public transportation in the Town of Oakville.

Evaluation of the major options:

- of transit service including dial-a-bus service,
- of operations including routes, schedules, fares, equipment, garage and maintenance facilities, and
- of transit management, including franchise, contract, public commission and city department.

Recommendation of the optimum form of service for the community.

ACRES

Welland — Port Colborne, Ontario
 Client: M. M. Dillon Limited
 for Department of Highways,
 Government of Ontario
 King's Highway No. 406
 Functional Planning Study
 Current

2223

Preparation of traffic assignment data, design hour volume forecasts and levels of service calculations; and engineering studies and cost estimates related to drainage, hydraulics, soils, structures and utilities for a functional planning study of Highway 406 from Merritt Road, Welland, to Highway 3, Port Colborne.

The work principally concerned three alternative routes (two with subalternatives) for the highway through the City of Welland. The work included, for each route, adjustments of traffic assignments, determination of interchange requirements, and studies of land use.

ACRES

Guelph, Ontario
 Client: Guelph Transportation
 Commission
 Urban Transit Study
 1971

2667

An examination of the present and future demand for public transportation services in the City of Guelph and of the efficiency and economy of the services being provided by the Guelph Transportation Commission.

ACRES

Niagara Peninsula
 Client: The St. Lawrence
 Seaway Authority
 Railway Crossing Study,
 Welland Canal, Ontario
 1967

1416

Reports on a series of investigations and studies to facilitate the consolidation of eight existing at-grade railway crossings of the Welland Canal into the minimum number of offgrade crossing facilities.

Southern Ontario

Client: Governments of Canada and Ontario
Joint Task Force on Water
Conservation Project in
Southern Ontario

Guidelines for Analysis Streamflow
Flood Damages and Secondary Flood
Control Benefits
1968

1831

Study of the use of systems analysis for the determination of the cost-benefit ratios of proposed multipurpose river basin development works in Southern Ontario.

The study was undertaken in three sections.

Section One of the study examined the step-by-step procedures for carrying out comprehensive hydrologic studies. The study considered in detail the use of advanced techniques for simulating mathematically the natural behaviour of streams and their response to a range of possible regulating works. The work is reviewed in a report entitled Streamflows (68 pages).

Introduction

Guidelines for Streamflow Studies

Selection of Data

Streamflow Synthesis of Transportation

Streamflow Generation

Flow Duration Analyses

Flood Flows

Design Criteria

References

Section Two of the study examined the application of flood level — damage curves in cost benefit analyses. The flood level — damage curve is obtained from a valid estimate in dollars of the amount of damage incurred by the urban flood plain areas at different levels of flooding. The study included an illustration, using Galt, Ontario, as an example, of the methodology for developing synthetic flood level — damage curves. The work is reviewed in a report entitled Flood Damages (136 pages).

Study of Flood Damages

Review of the Present State of the Art

The Galt Case Study: Background Information

Synthetic Direct Damage Curves

Indirect Damages

Flood Level — Damage Relationships

Appendices

Bibliography

Section Three of the study examined the conversion of costs and benefits to a common value base for integrated formulation and evaluation of development programs. The areas where secondary benefits occur were considered as including:

Recreation

Pollution abatement

Water supply

Erosion and sedimentation

Groundwater recharge

Irrigation

General economic development

The work is reviewed in a report entitled Secondary Flood Control Benefits (95 pages).

Secondary Flood Control Benefits for
Southern Ontario

Economic Analysis

Framework and Measurement

Standards

Secondary Benefit

Measurement Techniques

Bibliography

The recommendations resulting from the study are summarized in an appendix (29 pages) under the following headings:

Brief Stage Analyses

Feasibility and Final Stage Analysis

Oswego, New York

Client: Niagara Mohawk

Power Corporation

Cooling Water Thermal

Discharges Model Study

1970-71

2581

Design, construction and testing of two thermal/hydraulic models to investigate the thermal discharges into Lake Ontario by cooling water from the Oswego Power Plant (400 Mw) and from a proposed extension (1,600 Mw) of the plant.

The principal model will dynamically simulate the water and thermal flow patterns in a prototype area approximately 10,000 feet wide by 17,000 feet long. The model will be built to scales of 1:40 vertically and 1:250 horizontally.

The principal model will be calibrated using test results from an ancillary model. This model will simulate local water and thermal flow patterns in the vicinity of the discharge diffuser of the proposed plant extension. The model will be built to a scale of 1:20 both vertically and horizontally.

ACRES

Binbrook, Ontario
 Client: The Niagara Peninsula
 Conservation Authority
 Binbrook Dam
 1969

1928

Foundation and geotechnical investigations, hydrological studies, topographical and borrow material surveys, design, preparation of drawings and specifications, and supervision of construction for an earthfill dam.

The dam has a maximum height of 36 feet, is 3,500 feet long, and contains 120,000 cubic yards of earthfill. The dam has a reinforced concrete spillway section, founded on glacial till, consisting of one service spillway conduit (8.0 feet in diameter) and two low-level valved discharge conduits (each 2.5 feet in diameter). The service spillway conduit has a "morning glory" overflow type inlet.

The work included the raising (10 feet maximum) and widening of country road No. 33 over a length of 2,000 feet, and the reconstruction of a major culvert.

ACRES

Dominion of Canada
 Client: Government of Canada
 Privy Council Office
 Science Secretariat
 Water Resources Research
 Priorities in Canada
 1967

1667

Study to establish the order of priority for undertaking research projects covering the nature, control, conservation and use of the fresh water resources of Canada.

ACRES

New Brunswick
 Client: Community Improvement Corporation
 Development Study
 1967

1558

Report on a conceptual plan for the development of historic resources in the Mactaquac headpond area of New Brunswick.

ACRES

Toronto, Ontario
 Client: Metropolitan Toronto
 Planning Board
 Recreational Waterfront
 Development Study
 1970

2376

Development study of the Central Portion of the Scarborough sector of the Metropolitan Toronto Waterfront.

The work involved:

Analysis of the mechanisms of the erosion of waterfront

Evaluation of erosion control measures

Definition of the optimum role of this section of the waterfront

Conceptual planning of the development of this section as a recreational area, and of the works necessary to achieve that purpose

Evaluation of the effect of proposed developments on adjacent areas

Preparation of land acquisition and project schedules

Preparation of cost estimates

The work is summarized in a report (128 pages, 19 plates) under the following headings:

Introduction

Study Objectives and Methodology

Erosion and Engineering Design Considerations

Planning and Design Considerations

Development Plan

Bibliography

Appendix A

Appendix B

Appendix C

ACRES

Anchicaya River, Colombia
 Client: Corporación Autónoma
 Regional del Cauca
 Siltation Studies
 1968

1630

Study of the nature and extent of siltation in the Chidral Reservoir.

ACRES

Toronto, Ontario
Client: The Metropolitan Toronto and
Region Conservation
Authority
Watershed Study and Channel Improvements
1962 & 1966

933 & 1387

Study (933) and preparation of a report on: Review of the Authority's Plan for flood control and water conservation as it relates to the Don River watershed and preliminary study of the Don River watershed to establish the most suitable sites for flood control reservoirs, and detailed studies of selected sites.

ACRES

Dominion of Canada
Client: Government of Canada
Department of Mines and
Technical Surveys
Geological Survey of Canada
Groundwater Study
1966

1138

Development of an experimental analogue for the study of flow in porous media with particular reference to groundwater problems.

ACRES

Dominion of Canada
Client: Government of Canada
Department of Energy, Mines
and Resources
Thermal Pollution Study
Great Lakes Basin, Canada
1969

2084

Survey of the extent and effects of heated effluent discharges into the basin of the Great Lakes, and preparation of a schedule of recommendations covering the nature and economic value of further research.

ACRES

Dominion of Canada
Client: Governments of Canada and
Ontario
Joint Task Force on Water
Conservation Projects In
Southern Ontario
Watershed Control and
Development Studies
1968

1841

Study of the use of systems analysis for the determination of the cost benefit ratios of proposed multipurpose river basin development works in Southern Ontario.

ACRES

Dominion of Canada
Client: Government of Canada
Department of Energy, Mines
and Resources
Evaluation of Ice
Research Benefits
1969

2065

Studies of the characteristics and economic effects of natural ice, and preparation of a program for ice research based on a greatest potential benefit scale.

ACRES

Bocabec River, New Brunswick
Client: Government of Canada
Department of Fisheries
Fisheries Research Board
of Canada
Research Facility
Feasibility Study
1967

1518

Study of the feasibility of the establishment on the Bocabec River of an experimental station for the investigation of the spawning and rearing of salmon and trout.

South Nation River

Ontario

Client: Government of Ontario
Department of Agriculture
Agriculture Rehabilitation
and Development Branch

Watershed Study

1965 & 1966

1203 & 1397

Report on Phase 1 of the engineering study of the South Nation Watershed. This section of the study covered:

A review of the physical characteristics and hydrology of the watershed

Estimates of the amount of poorly-drained land with high agricultural potential that could be improved for agricultural purposes by means of gravity drainage systems

The effect that multipurpose reservoirs would have on summer and winter flows, on the flooding of low-lying areas and on the development of irrigation farming

A preliminary evaluation of the flood control benefits that might result from channel improvements

An outline of the work to be done under Phase 2 of the study in order to establish the details and estimated costs of various pilot works (29 pages, 6 plates)

Report on Phase 2 of the engineering study of the South Nation Watershed. This section of the study covered:

Reviews of the characteristics of the watershed and its flooding, drainage, pollution and land use problems

Comparisons related to flow characteristics of various proposed channel improvement and of the location, capacity and operation of various proposed reservoirs

Preliminary designs and evaluations of proposed improvements of two sections of the South Nation River channel

Preliminary designs, estimates of capital cost, construction schedules and evaluations for the dams, dykes and control works of three proposed reservoirs (103 pages, 14 plates)

St. Lawrence Seaway

Client: The St. Lawrence Seaway
Authority

Groundwater Flow Study

1968

1684

Development and use of a digital computer program for the study of a mathematical model of groundwater flow.

Toronto, Ontario

Client: The Metropolitan Toronto
and Region Conservation
Authority

Watershed Study

1963

1012

Study of the Mimico Creek watershed including geological explorations and mapping, investigations of possible reservoir sites, hydrology studies, economic studies of various methods of maintaining a minimum summer flow, and preliminary designs and estimates for proposed control works.

Colombia

Client: Corporacion Autonoma
Regional del Cauca

La Victoria-Cartago

Irrigation Project

1965

1205

Assistance with the hydrology studies, foundation investigations, structure designs and procedures for a dam on the La Vieja River.

ACRES

Credit River, Ontario
Client: Credit Valley Conservation
Authority
Flood Levels Study
1965

1280

Study of the physical characteristics and hydrology of the Credit River watershed, and estimates of peak flows and floodwater levels.

ACRES

Fredericton, New Brunswick
Client: The New Brunswick Electric
Power Commission
Fish Population Conservation
1967

1140

Engineering for a fish collection and transportation system for obtaining the stock required to maintain the fish population in the Saint John River, both above and below the Mactaquac Hydroelectric Power Development.

ACRES

Paramonga, Peru
Client: Socieda Paramonga Ltda.
Irrigation Water Storage
1967

1599

Report on investigations to locate storage facilities for irrigation water from the Paramonga River and an evaluation of the groundwater potential of the Fortaleza Valley.

ACRES

Kenya
Client: Food and Agriculture
Organization of the
United Nations
Irrigation Study
1966

1086

Studies of the irrigation and power potentials of the Lower Tana River Basin, and preparation of a preliminary development plan for the area and of a detailed development plan for a portion of the area.

ACRES

Toronto, Ontario
Client: The Metropolitan Toronto
and Region Conservation
Authority
Watershed Study
1962

933

Study of the Don River watershed including side selection studies, hydrology studies, foundation investigations, and preliminary designs and estimates for proposed control works.

ACRES

Toronto, Ontario
Client: The Metropolitan Toronto
and Region Conservation
Authority
Channel Improvements
1966

1387

Report and engineering designs for a long-term program of erosion control and channel improvement measures for the West Branch of the Don River.

ACRES

Dominion of Canada
Client: Government of Canada
Canadian Wildlife Service
Development Study
1967

HM53

Development and application of criteria for the evaluation of wild areas in their supporting role for wildlife resources, particularly migratory wild fowl.

ACRES

Taiwan
Client: United Nations
Special Fund
River Basin Development Study
1966

1142

Studies of the irrigation and power potentials of the Choshui and Wu River basins in western Taiwan.

ACRES

Dominion of Canada
Client: Government of Canada
Department of Transport
Ice Forces Measuring Systems
1969

2113

Analysis of the characteristics of three given shapes for light-houses, evaluation of the feasibility of developing systems for measuring ice forces on each of the lighthouse shapes, studies of the forms and characteristics of measuring components and systems, selection of a system most suitable for each light-house shape, and preparation of preliminary designs and cost estimates for each recommended system.

ACRES

Windsor, Ontario
Client: Ford Motor
Company of Canada
Air Pollution Control
1967

1627

Study of Air Pollution Control in Oakville and Windsor, Ontario, for the Ford Motor Company

1967

Development and use of digital computer program for calculating the ground level concentration of contaminants at various locations, as a function of the temperature and contaminant density of stack gases, the stack height and meteorological conditions.

ACRES

Lower Great Lakes, Canada
Client: Canada Centre for Inland
Waters
Department of the
Environment
Government of Canada
Burlington, Ontario

Investigate Feasibility,
Effectiveness and Costs of
Removal and/or Decontamination
of Bottom Sediments of the Lower
Great Lakes
1972

2952

To detail and specify case histories of all occasions on a world-wide basis when dredging procedures have been utilized for the removal and disposal of bottom sediments contaminated by both liquid and solid industrial effluent, in both marine and non-marine environments, including any observed ecological effects (period of consideration to run from 1939 to present)

To compile and evaluate the relative efficiencies of all known dredging techniques, equipment, specifications and operational limitations, and to present a detailed review of all known techniques, equipment, specifications and operational limitations, for both subaqueous and surface disposal.

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